september 1952

THE FOUNDRYMEN'S OWN MAGAZINE

American Foundryman

34 *Job record card helps supervisors*

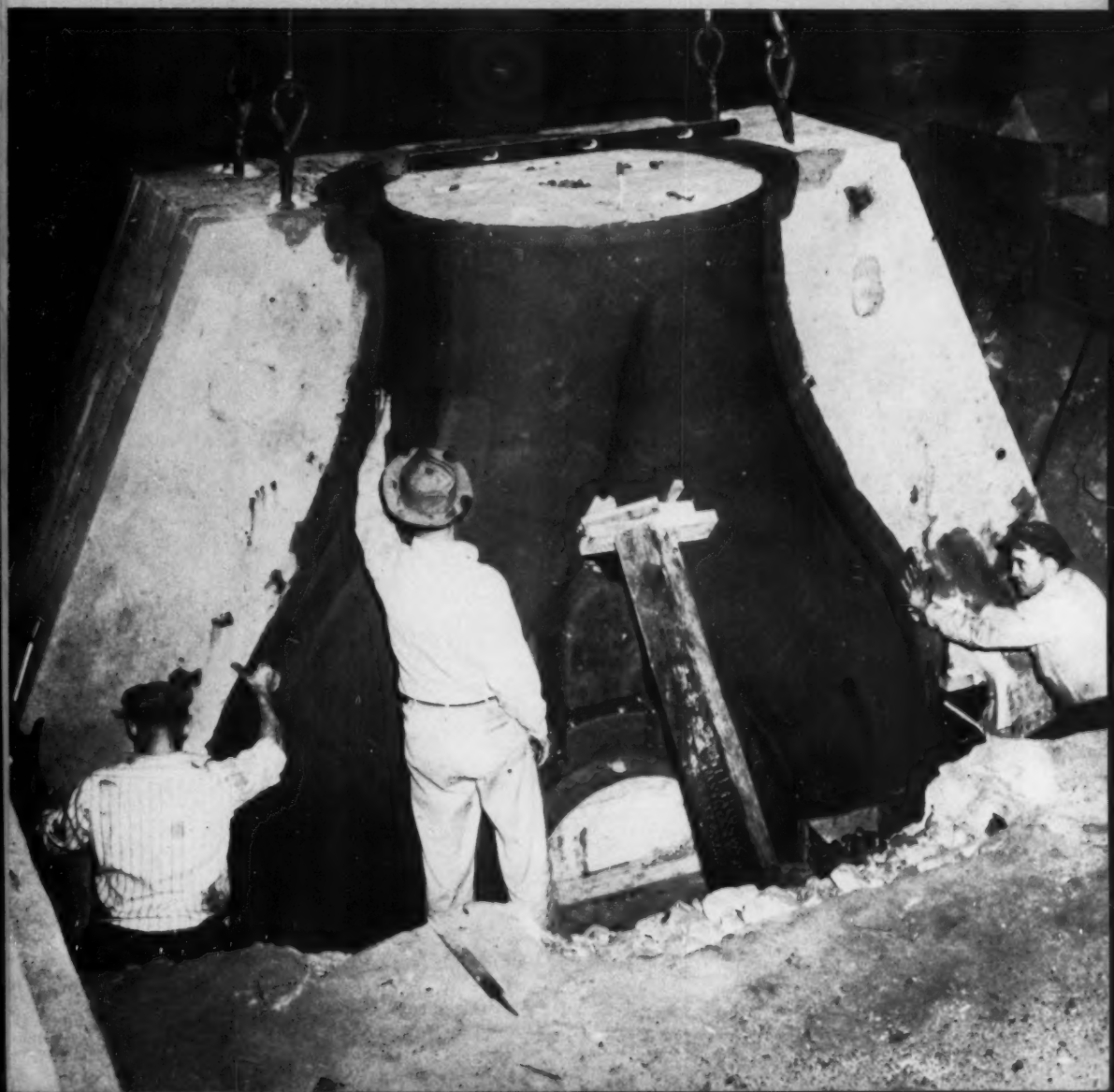
37 *"Nuisance casting" production*

40 *Crucible service life*

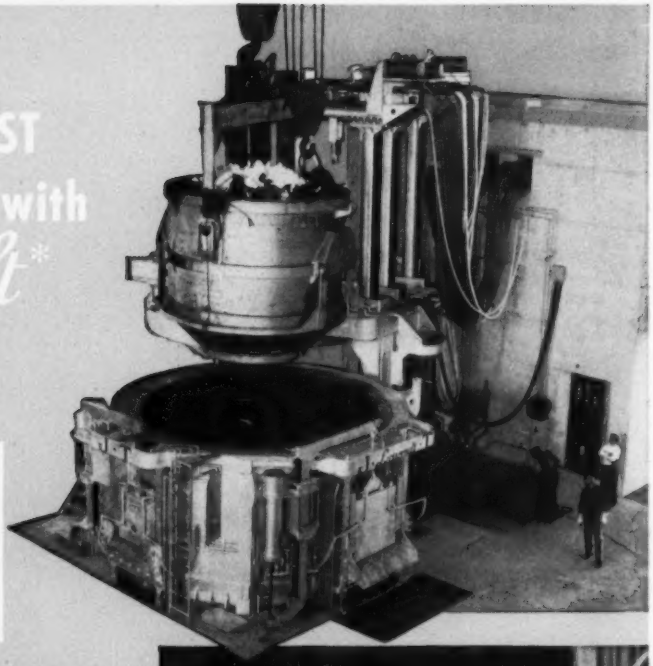
44 *Non-ferrous cleaning room layout*

53 *Truth about foundry dust diseases*

56 *Is college training adequate?*

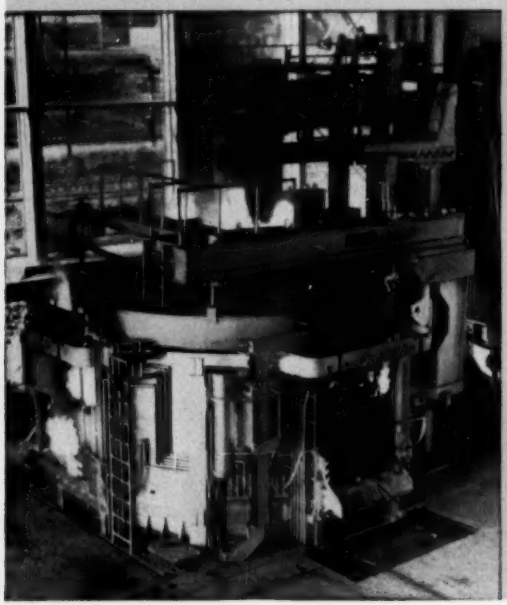


WORK GOES FAST and SMOOTHLY with *Lectromelt** FURNACES



Right: Labor-saving top charging lets a Lectromelt Furnace get to work *fast*.

Below: With a Lectromelt Furnace, you can crowd on the power while holding close control on quality.



Lectromelt's hydraulic tilting mechanism provides positive, easily controlled, trouble-free operation. For Catalog No. 8 giving more details, write Pittsburgh Lectromelt Furnace Corporation, 316 32nd Street, Pittsburgh 30, Pa.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*

*Reg. T. M.

MORE V.C.M.*

MAKES CROWN HILL A BETTER SEACOAL

Crown Hill is ground and screened in six different grades to match the grain size of molding sands. No matter what your class of work, FEDERAL has the correct grade of seacoal for it.

Research into the problems of seacoal performance has proved that, to make good seacoal, the base coal must be high in volatile combustible matter (V.C.M.). Low sulphur and ash content, also, are desirable. The coal mined by FEDERAL at Crown Hill more than meets such requirements. Note the V.C.M., sulphur and ash content in the analysis of Crown Hill coal made by the Bureau of Mines, U. S. Department of the Interior.

For comparison, check the analysis of the seacoal you're now using. Perhaps you'll find you're not getting the quality you'd get in Crown Hill.

PROXIMATE ANALYSIS
(Moisture Free)

Volatile Matter (V.C.M.)	38.9%
Fixed Carbon	57.4%
Ash	3.7%

ULTIMATE ANALYSIS

Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
Fusion Point of Ash	2780° F

FEDERAL

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

Seacoal Plant—CROWN HILL, W. VA. • CHICAGO • DETROIT • MILWAUKEE
RICHMOND, VA. • ST. LOUIS • CHATTANOOGA • NEW YORK • *Mines*—UPTON, WYO.

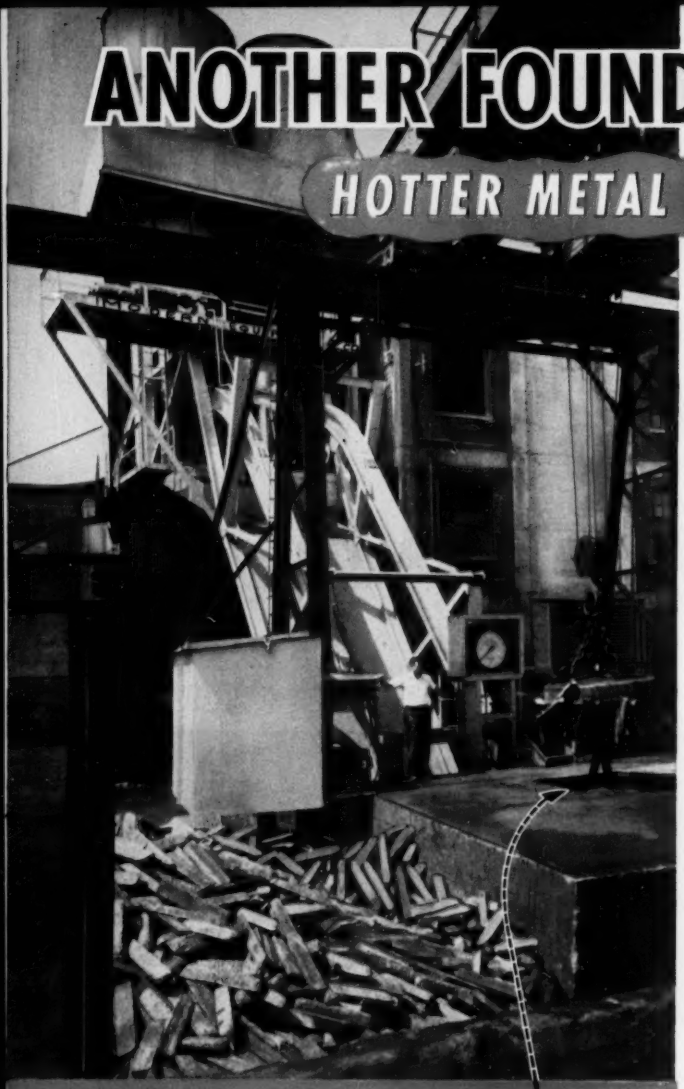
IN TWIN CITIES: Charles D. Gallaher, 11150 S. Old Shakopee Rd. Minneapolis 20, Minn.

FEDERAL

ANOTHER FOUNDRY REPORTS,

HOTTER METAL Thru MODERN Charging!

SAVES METAL... SPEEDS UP PRODUCTION OF THIN WALL PIPE...



2" to 16", thin-wall pipe isn't the easiest pouring. But there is a one-best-way. Here at Buffalo Pipe & Foundry Company where a variety of thin, heavy pipe and fittings are made, MODERN charging methods are helping to melt hotter metal for this precision pouring. Waste is reduced! Quality of pipe is uniformly good! The MODERN truss-type charger swivels to serve either of the two number 11 cupolas. Behind the hoisting of the 54" x 54" SMALL-CONE bucket is a 30 H. P., gearhead motor.

*Small-Cone Side-Discharge

Uniform, side diffusion of metal over the full working area of the cupola improves operations in many foundries where this latest type, SMALL-CONE, MODERN charging bucket is used. Practical foundrymen everywhere report:

1. Wider diffusion of metal and coke maintains loose centers and compact sides . . .
2. The more level charge prevents shifting of large components . . .
3. Less air pressure is required and the softer blast penetrates the center of the charge . . .
4. Refractory burnout is reduced as much as 30%.
5. Coke ratios are lowered . . .
6. Hotter metal is tapped at the cupolas . . .

These and other advantages add up to a timely approach to improving quality, saving metal and reducing accidents.

Foundrymen who outline their planning problems on their company letterheads get all the details free! For catalogs and film-loan use the handy coupon . . .

*(1) MODERN 54" x 54" Weigh Hopper, normally mounted in a scale, is fully enclosed in the concrete pit. (2) All-welded, SMALL-CONE bucket is equipped with heavy-duty skip having dependable, safety locks. (3) Doors of the 54" x 54" bucket swung open to expose the SMALL-CONE which effectively levels the charge.

MODERN EQUIPMENT CO.
PORT WASHINGTON, WISCONSIN

MODERN EQUIPMENT CO., Dept.A.F-9, Port Washington, Wis.
Mail to my attention:
Catalogs on metal pouring systems and ladles ☐
Cupolas and cupola chargers . . . 147A ☐
Cranes and monorail systems . . . 150 ☐
More information on FREE use of MODERN films ☐

Company .....
Street ..... Zone .....
City ..... State .....
Att'n. of .....

American Foundryman

September 1952 / *Volume 22 • Number 3*

Official Publication of the American Foundrymen's Society

Setting an external core for a 50,000-lb. 4-stage centrifugal blower casting at Chambersburg Engineering Co., Chambersburg, Pa. The finished mold—entirely cement-bonded sand—consists of a bed, a semi-cylindrical core with a separate nozzle core at each end, and four external cores. Already in place is one of the nozzle cores (dark colored). At the start, a bed of cement sand is levelled in a frame containing core prints. The semi-cylindrical core is rammed in place in a box assembled on the bed. Cores are aligned using gage lines on the bed and a level. All compound surfaces are carefully gaged during assembly to insure specified wall thicknesses.

Publications Committee

H. M. St. John, *Chairman*
Crane Co., Chicago
C. H. Lorig
Battelle Memorial Institute
W. D. McMillan
International Harvester Co., Chicago
H. J. Rowe
Aluminum Co. of America, Pittsburgh
F. J. Walls
International Nickel Co., Detroit

A.F.S. Headquarters

616 S. Michigan, Chicago 5
Wm. W. Maloney
Secretary-Treasurer
S. C. Massari, *Technical Director*

American Foundryman

H. F. Scobie, *Editor*
Paul Fountain, *Assistant Editor*
Terry Koeller, *Advertising Manager*
Helen Dudek, *Advertising Production*
LaVerne Lahn, *Circulation*

Advertising representatives

Central
R. E. Cleary, *Commercial & Savings Bank Bldg., Berea, Ohio Berea 4-7719*

Midwestern
H. Thorpe Covington Co., *677 N. Michigan Ave., Chicago Superior 7-8054*

Eastern
Robert B. Weston, *550 Fifth Ave., New York, N. Y. Plaza 7-6454*

Trends

33 Toward higher productivity

Operations and methods

34 The job record card, a valuable tool for the jobbing foundry
R. W. Griswold
37 Small foundry, small castings
44 The non-ferrous cleaning room
Martin G. Dietl
59 Causes of hot tears in steel
65 Design-production teamwork in the steel foundry
J. O. Felt

Technology

40 Foundry crucible service life
R. A. Heindl
53 The truth about disease caused by foundry dusts
O. A. Sander
56 Are technical graduates getting adequate training in college?
Hiram Brown

In the news

50 1953 A.F.S. Convention
55 Directors set financial policies
63 S & H & AP progress report
68 Regional conference programs
71 1953 European foundry tours
104 News of technical committees

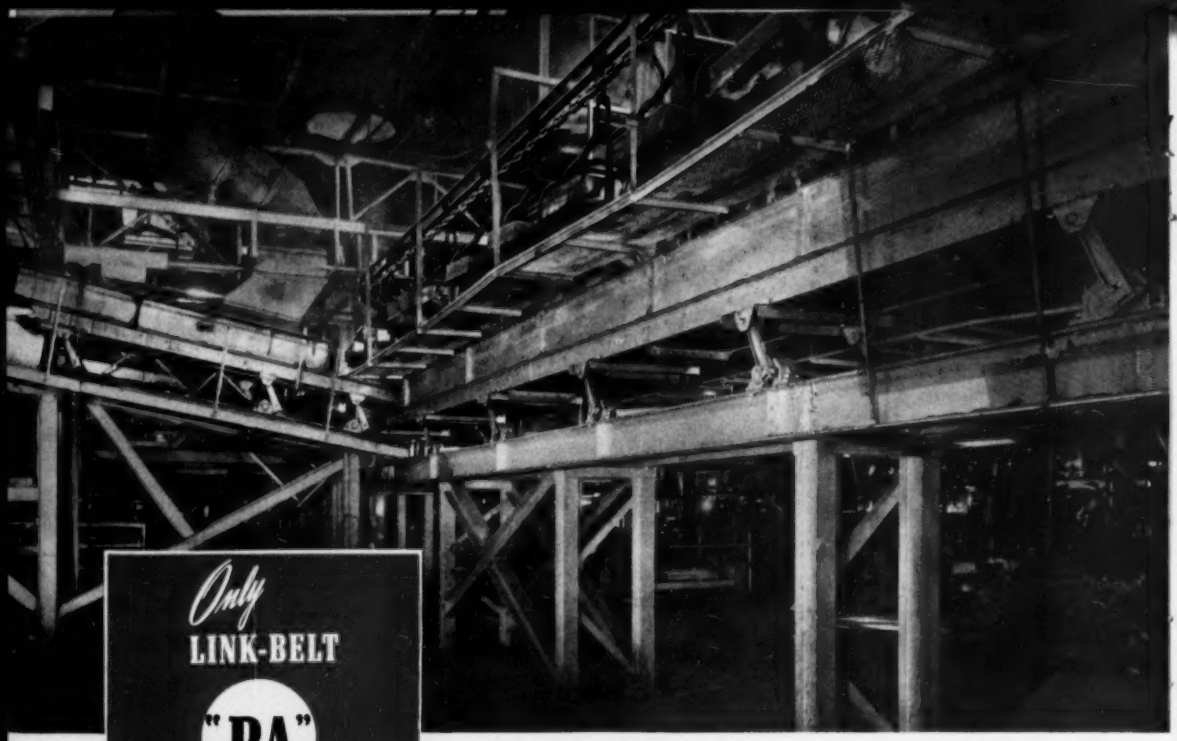
People

27 *Foundrymen in the news*
90 *A.F.S. introduces*
95 *Chapter officers and directors*

Departments

17 *Products and processes*
18 *Free foundry information*
87 *Abstracts*
92 *Book reviews*
72 *Directory of A.F.S. chapters*
75 *Chapternews*
97 *Rammed up and poured*
106 *Foundry tradenews*
112 *Coming events*
114 *Advertisers' index*
115 *Classified advertising*

Published monthly by the American Foundrymen's Society, Inc., 616 S. Michigan Ave., Chicago 5. Subscription price in the U.S., Canada, and Mexico $3.00 per year; elsewhere, $6.00. Single copies 50c. Entered as Second Class Matter, July 22, 1938, under Act of March 3, 1879, at the Post Office, Chicago.



Only
LINK-BELT
"PA"
Oscillating Conveyor

In modernized midwestern foundry, two "PA" Oscillators handle hot castings. Coming in from the left, 50 ft. transfer conveyor feeds 75 ft. cooling and sprueing conveyor. Link-Belt Overhead Trolley Conveyor (above) delivers molds to shakeout.

...gives you these 9 conveying advantages!

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC.

(1) "PA" POSITIVE ACTION — Motion is imparted to the conveyor trough by a roller-bearing, constant-stroke eccentric, driven at selected speed. Uniform, continuous flow is assured regardless of overloads or surges.

(2) LEAK-PROOF — Standard trough is a single piece of metal with high sides—eliminates leakage and spillage.

(3) DUST-TIGHT — Escape of dust or gases can easily be eliminated by addition of a metal cover with flexible connections at loading and discharge points.

(4) COMPACT — A "natural" medium for passing congested locations—opening need be only slightly larger than the trough. Many are installed in small trenches to receive material from apparatus above.

(5) LONG LIFE — All-metal, with a minimum of moving parts, no joints to abrade. Handles very hot, sharp, jagged or oily materials with virtually no wear.

(6) MINIMUM MAINTENANCE — Only the drive need be lubricated. Steel torsion bars that provide the spring action last indefinitely without attention.

(7) VERSATILE — Widths from 8 to 54 in., lengths up to 100 ft. Efficiently handle from a few pounds to 200 tons per hour. Dividers can be installed to convey more than one material simultaneously, and discharge is possible at any desired points.

(8) GENTLE — No breakage of thin or brittle castings. Even a cigarette ash can travel the entire length of the trough intact.

(9) ECONOMICAL — Particularly on longer runs, first cost is low. Installation and alignment are simple, fast.

Yes, on any count, Link-Belt "PA" Oscillators are years ahead. These revolutionary conveyors have proved themselves efficient for handling coolant-soaked steel turnings, foundry shakeout sand and castings, and other sharp, abrasive, hot materials. Ask for Book 2444 containing complete information.

LINK-BELT
CONVEYORS and PREPARATION MACHINERY

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in Principal Cities.

12,358

DELTA
FOUNDRY PRODUCTS
SPEED PRODUCTION OF
BETTER, CLEANER CASTINGS
AT
Lower Cost

CORE AND MOLD WASHES:

FOR STEEL:

Delta Special Core & Mold Wash Base — Used by more steel foundries than all other types of washes combined.

Delta SteelKoat — a finished high fusion waterproof wash.

FOR ALL TYPES OF SAND CAST METALS:

Delta ThermoKoat — It's plasti-lastic, non-heat shocking, highest fusion and hot strength.

Delta Z-Koat — a zirconium wash with unusual properties in contact with molten metal.

FOR GRAY IRON, MALLEABLE, BRONZE AND BRASS:

Delta GraKoat — no reaction with molten metal.

Delta BlacKoat — a black wash, free from carbon, no gas in contact with molten metal.

FOR GRAY IRON:

Delta BlacKoat S-5 — a new and different wash. Produces results, on gray iron castings, unequalled by any other wash.

FOR NON-FERROUS AND LIGHT METALS:

Delta NonferrusKoat — produces unusually smooth surface castings.

PARTING COMPOUNDS:

Delta Partex — (Nutshell partings) has lycopodium properties, non-injurious and non-hazardous to use.

Delta Liquid Parting — Low-cost, highly effective and lasting.

MUDDING & PATCHING COMPOUNDS:

Delta Sliktite — a light colored mud for all types of metal castings.

Delta Ebony — a black mud for gray iron, malleable and nonferrous work. All mudding compounds seal core joints and hold joints together at high temperatures.

NO-VEIN COMPOUND:

A special compound, not iron oxide. A high hot strength and sand plasticizing material. Stops veins and penetration.

MOLD SURFACE BINDERS—LIQUID:

Delta Spray Binders — Produce dry sand mold results by surface spraying of green sand molds.

PERMI-BOND:

Eliminates Sea Coal Nuisance: The new modern scientific sea coal replacement.

DRI-BOND:

A new type of Dry Binder which provides new economies. Fast-baking, reduces veining and penetration. Can be used with old sand equally as well as with new sand.

BONDITE: Produces a reducing mold atmosphere:

For Steel and Gray Iron — Use Delta Bondite, a dry binder which becomes waterproof on drying and produces mold atmosphere which is high in reducing gas.

96-B SAND RELEASE AGENT:

Another Foundry *"First"* by Delta. By adding 8 oz. or less per ton to your core or molding sand mixes, your sands will flow freely. 96-B is completely volatile at elevated temperatures and does not contaminate the sand.

CORE ROD DIP OIL NO. 224X:

Ties core rods and wires into the cores:

Rods and wires coated with Delta Core Rod Dip Oil adhere to the sand. Eliminates need for 50% of the rods and wires and reduces core breakage.

DELTA SAND CONDITIONING OIL:

Sticking core sand mixes work freely in core boxes when sand conditioning oil is added to core sand mixers.

CORE OILS:

High tensile, low gas, faster baking, exceptionally economical to use.

Get the Facts...

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

SNAGGING . . .

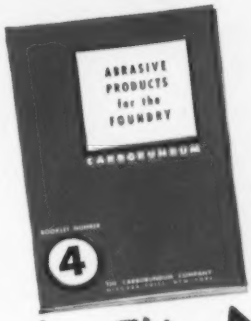
Only CARBO

TRADE

"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

Snagging Wheels by CARBORUNDUM offer you the ideal cost-cutting combination of the *right* abrasive grain and the *right* bond, tailored to *your* work and *your* equipment. Check the table:

BEST FOR SNAGGING	STEEL castings and forgings—and high tensile non-ferrous materials	IRON cast, grey, chilled—hard malleables and low tensile non-ferrous materials
ON HIGH-SPEED GRINDERS (9500 SFPM and lower)	*Use* "ALOXITE" aluminum oxide B5 resinoid wheels	*Use* "CARBORUNDUM" silicon carbide B5 resinoid wheels
	THE NEW B5 RESINOID BOND imparts far greater strength to wheels—provides high resistance to mechanical shock and heat shock. This means added safety and lower fatigue, in addition to a high cutting rate and long wheel life.	
ON LOW-SPEED GRINDERS (6500 SFPM and lower)	*Use* "ALOXITE" aluminum oxide V10 vitrified wheels... tough, sharp grain in a new, rugged long-lasting bond especially developed for this service	*Use* "CARBORUNDUM" silicon carbide VD vitrified wheels... newly developed blocky, friable abrasive in a new high-efficiency bond



This "tell-all" booklet is FREE!

Write Dept. F 81-80 for your copy

For every abrasive job in your foundry—whether your need is for straight wheels, disc wheels, mounted points, cones and plugs, core files—there's an abrasive product by CARBORUNDUM designed to do the job better, faster, at lower cost.

ORDER FROM YOUR CARBORUNDUM DISTRIBUTOR TODAY. He's your best bet for complete stocks, prompt delivery, experienced counsel on latest developments in the field. You'll find him listed in the yellow pages under "Abrasives." Phone him today—it's to your profit!

RUNDUM

MARK

offers ALLabrasive products...to give you the proper ONE

— *for the job in hand!*

• Black Hills Bentonite may be exactly what you want. It is strong, uniform and dependable. For some applications, it is the ideal clay because it surpasses all others in toughness. It excels all other clays in dry strength. If you require maximum permeability combined with maximum hot strength, choose Black Hills Bentonite.

But maybe you do not want toughness. Maybe your sand problems are *different*. Then remember that Black Hills Bentonite is only one of four bonding clays in the E. C. P. line. Each has distinct properties. If one of these clays does not answer your need, there are numerous combinations available which will. Our 26-year experience is at your command — now, without obligation.

• *Write us for reliable, factual literature on Black Hills Bentonite or any E. C. P. product listed below.*

E C P Since 1926

EASTERN CLAY PRODUCTS
DEPARTMENT
International Minerals & Chemical Corporation — 20 NORTH WACKER DRIVE, CHICAGO 6

QUALITY, SERVICE, DEPENDABILITY, PROGRESS

MINERALS International CHEMICALS

DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO CORE PASTE
BALANCED REVIVO • BONDACTOR • CUPOLINE • DURA PRODUCTS • WESTONITE

An Important Message to the Man Who Asks:

"How Can I Increase Core Production?"

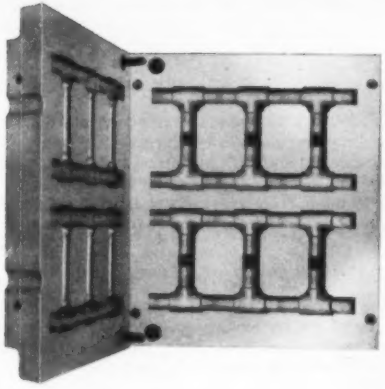
When you analyze the problem of increasing core production with your present equipment you must consider the core box itself. How much time do you lose annually with costly interruptions for core box repairs: in sampling and checking when new or repaired core boxes are put into production; and in scrapped cores because of worn cavities? Think of this time as *lost production!*

Now, see how Duplicast solves this problem for you: Because with Duplicast you find that core boxes are cheaper to replace than to repair you will have extra core boxes on hand at all times and there will be no lengthy interruptions of production schedules. No sampling or checking is necessary when a new Duplicast core box is put in production—just replace the new core box and start rolling. There'll be no fins in castings from a Duplicast core box because the accurate cavities are always *exactly* duplicated. You will realize a substantial reduction in scrap and in addition save up to 80% on core box replacement costs.

These are facts—reported by users of Duplicast from coast to coast. Wouldn't it be worth your while to investigate?

DUPLICAST

"The Expendable Core Box"



Duplicast is the ideal core box for high production schedules and for complicated irregular contoured shapes and cavities which otherwise are costly to replace or repair. Duplicast core boxes are made of a wear resistant aluminum alloy by a patented method in which a permanent hob, or mandrel, is used to duplicate any number of core boxes or dryers of exact dimensions within plus or minus .003 inches within a distance of 12 inches. Exact match on cavities can be held within plus or minus .001. Every Duplicast core box is produced with a mirror-like finish in the cavities without hand finishing or tooling of any kind.

INDUSTRIAL PATTERN WORKS

2625 W. Belmont Ave. • Chicago 18, Illinois

FOR MORE DETAILS — MAIL COUPON TODAY

Industrial Pattern Works
2625 Belmont Avenue—Chicago 18, Ill.

Gentlemen: I am interested in Duplicast and would like further information.

☐ Send Bulletin D-1. ☐ Have representative call.

Name_____ Title_____

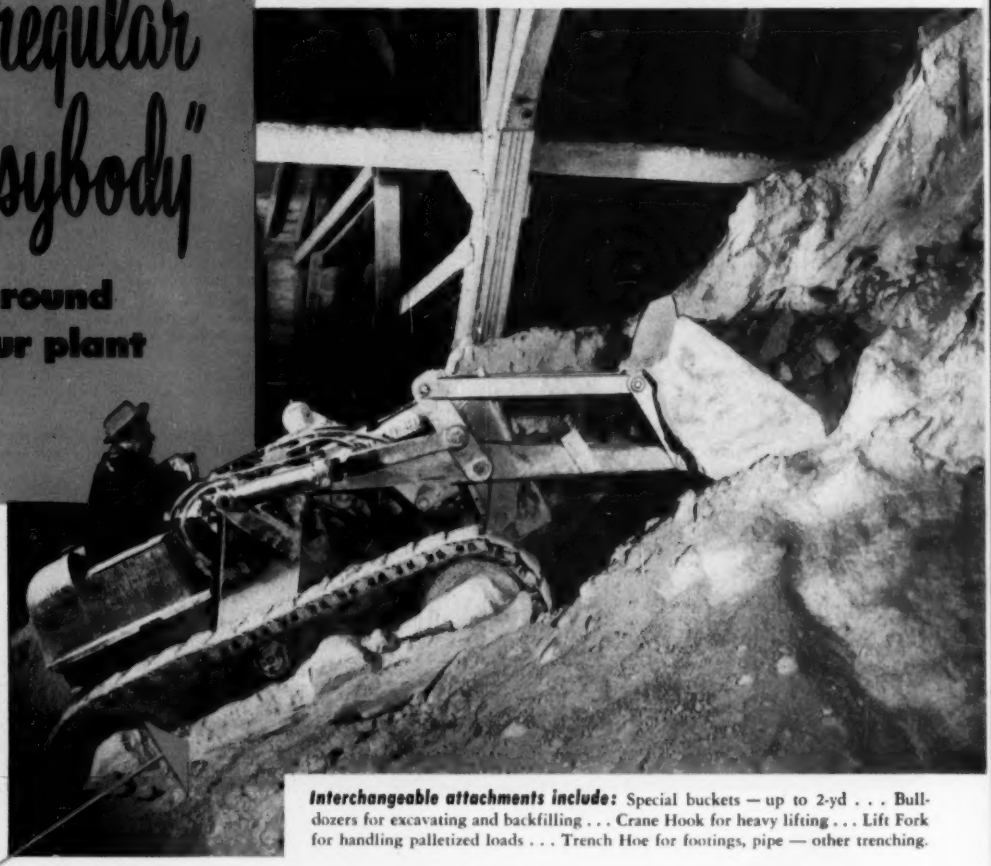
Company_____

Address_____

City_____ State_____

A regular "busybody" around your plant

Sticks Its Nose into Any Material-Handling and Excavating Work . . . And Gets the Job Done Fast



Allis-Chalmers HD-5G

1 cu. yd. Bucket, 40 drawbar hp. Dumping Height — 9 ft., ¼ in.

Interchangeable attachments include: Special buckets — up to 2-yd . . . Bull-dozers for excavating and backfilling . . . Crane Hook for heavy lifting . . . Lift Fork for handling palletized loads . . . Trench Hoe for footings, pipe — other trenching.

Foundry Sand — Wades Right Into Any Stockpile — Indoors or Out

. . . scoops out and carries a full cubic yard at a pass. Only a crawler tractor gives you the traction and power you need for tough digging as well as material handling . . . and the flotation for really heavy going. And only this A-C crawler gives you an extra, fast reverse to increase output, plus 1,000-hour lubrication of truck wheels to save you 30 minutes' greasing time every day.

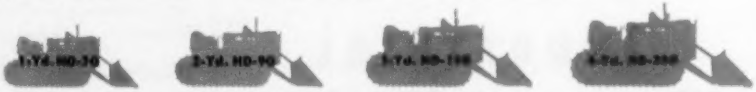
Coal — Stores, Compacts and Reclaims

This flexible unit can build stockpiles in any available space. Ability to spread and pack coal in thin, horizontal layers eliminates flues — the main cause of spontaneous combustion. Standard track shoe eliminates coal breakage. As coal is needed, the HD-5G quickly loads from stockpile to trucks. On short hauls, it dozes or carries coal directly to plant.

Waste — Cleans Up and Loads

Out in the yard, this busy tractor cleans up and loads industrial waste, excavates, trenches and backfills on new construction, spots cars, clears snow . . . handles many other jobs winter and summer.

Now . . . to meet the challenge of ever-increasing production demands, Allis-Chalmers multiplies its scope of tractor usefulness even more. And here's how. The same basic design . . . the same versatility that make the HD-5G Tracto-Shovel so useful is now available on all four models of modern Allis-Chalmers tractors.



40 drawbar hp. | 72 drawbar hp. | 109 drawbar hp. | Torque Converter Drive 175 net engine hp.

Write for free literature in the Tracto-Shovel line.

ALLIS-CHALMERS

TRACTOR DIVISION · · · MILWAUKEE 1, U S A

SAFEGUARD YOUR PERSONNEL and your PROPERTY!

Eliminate dangerous gases, fumes and dust with a MULTI-WASH collector

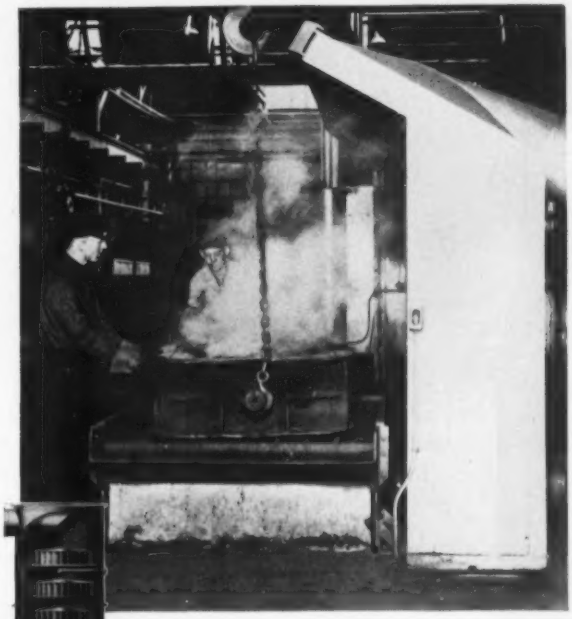
It will pay you to consider the many advantages of a Multi-Wash dust collecting system.

With Multi-Wash you won't have to dig yourself out of accumulated dust particles and furthermore you'll eliminate the danger of a spontaneous fire. Personnel too, will find conditions more agreeable and production will increase, because the cause of sick leave due to ailments attributable to dust and fumes will be substantially eliminated.

You can start in a small way to clean up objectionable dust and fumes by installing a Multi-Wash unit in the most offensive area first. Later, you can add on as conditions warrant.

From a dollars and cents approach you'll be far ahead with Multi-Wash both production-wise and maintenance-wise.

Be wise, contact your local Schneible representative or write direct for a further study of your dust and fume problem.



MULTI-WASH

MULTIPLIES WASHING FOR TOP EFFICIENCY

CLAUDE B. SCHNEIBLE CO.

P. O. Box 81, North End Station
Detroit 2, Michigan

PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

SCHNEIBLE

LARGEST SELLING

LIQUID PARTING

IN THE WORLD!

STEVENS LIQUID PARTING

a little goes a long way

. . . has become a phenomenal "best-seller" because of its enthusiastic and wholehearted acceptance by foundrymen everywhere.

Indeed, we are mighty proud of this product. If you haven't tried it in your operations, we suggest you write us immediately for a working sample.

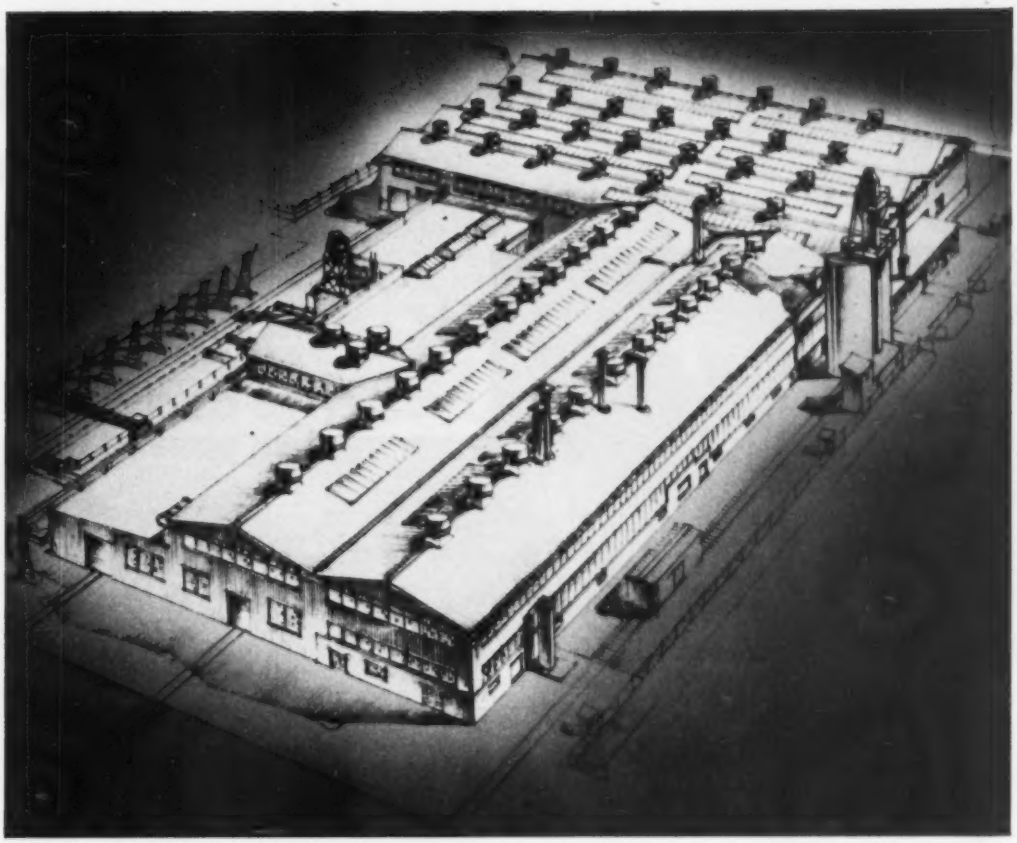
This thin, transparent liquid can be sprayed, swabbed or brushed on patterns or matchplates to form a tough surface film that guarantees clean parting and smooth molds.

It's economical, too — 20 to 60 molds per application lowers costs and proves a little goes a long way! Call your Stevens representative today or write direct.

"EVERYTHING FOR A FOUNDRY"
TRADEMARK

FREDERIC B. STEVENS INCORPORATED

DETROIT 16, MICHIGAN



Whatever your Foundry requirements

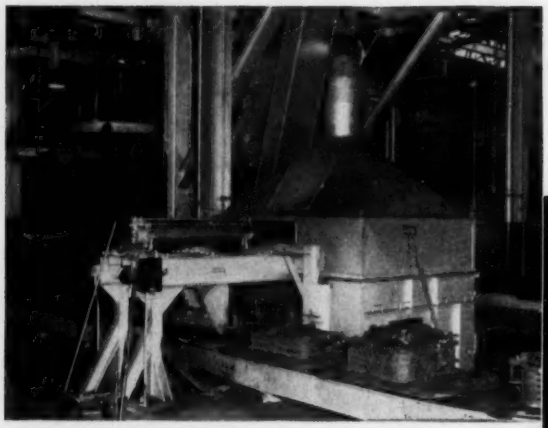
THE
H·K·FERGUSON
COMPANY
ENGINEERS AND BUILDERS

...Appraisals
Layout • Design
Construction • Equipment
Installations • Development
Alterations • Expansion

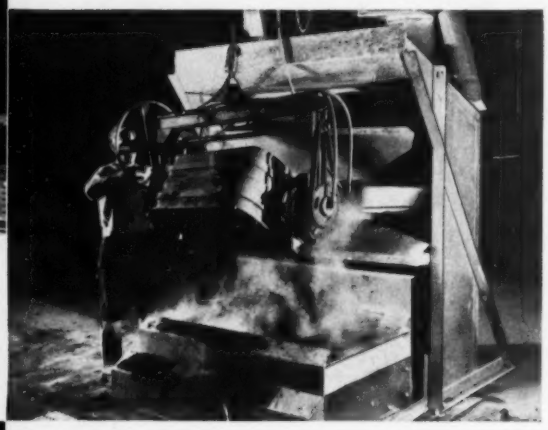
Call Ferguson!

EXECUTIVE OFFICES: Ferguson Bldg., Cleveland • NEW YORK OFFICE: 19 Rector St. • HOUSTON OFFICE: 2620 S. Main St. • CHICAGO OFFICE: 1 N. LaSalle Bldg. • LOS ANGELES OFFICE: 411 West 5th St. • CINCINNATI OFFICE: 31 E. 12th St. • SAN FRANCISCO OFFICE: 74 New Montgomery St.

Let's have a SHOWDOWN on



Enclosed hood providing complete enclosure with openings for flask upsetting and casting removal. Most economical design for removal of dust and gases.



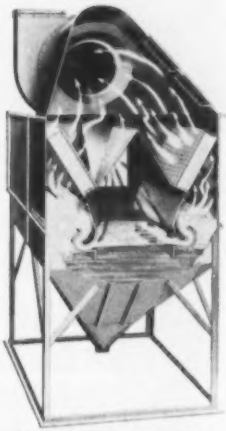
Side hood designed for shakeouts up to 8-ft. wide where material handling methods prevent more complete enclosure.

Side hood designed for shakeouts over 8-ft. wide requiring overhead material handling. Side shields seldom interfere with crane operator, yet cut cost of installation by reducing size of Roto-Clone required.

Special hood design for semi-mechanized foundry where molds are upset to floor openings at end of gravity rolls located at each molder's station.

SHAKEOUT Dust Control!

The Right ROTO-CLONE PLUS Proper Hood Design Will Solve Your Problems

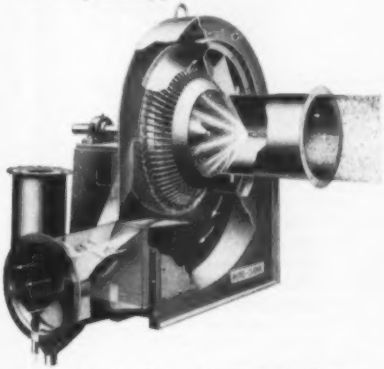


Type N Roto-Clone Arrangement D — cutaway shows dual impellers and distinctive water curtains created by air flow. Highest efficiency maintained without aid of moving parts.

Too many foundries are still operating shakeouts as "dust nuisances," both to themselves and to their neighborhoods. The reason—because of such factors as (1) flask and casting size and flow, (2) existing material handling equipment and (3) cost of dust control systems, it is *assumed* that efficient dust control is either impossible or impractical.

Roto-Clone* accepts all these variables as *influencing* but *not limiting* factors. The AAF line of Roto-Clone equipment offers a type and capacity unit to economically handle the larger volumes and lighter loads typical of many a shakeout. But that's only half the story! AAF engineers analyze each shakeout operation—then prescribe and design the type of hooding that will provide maximum dust removal at point of generation without hampering your foundry production.

This kind of "dust engineering" has cleaned up many a problem shakeout. Before you say, "It can't be done," call your local AAF representative or write us direct. We like the tough ones!



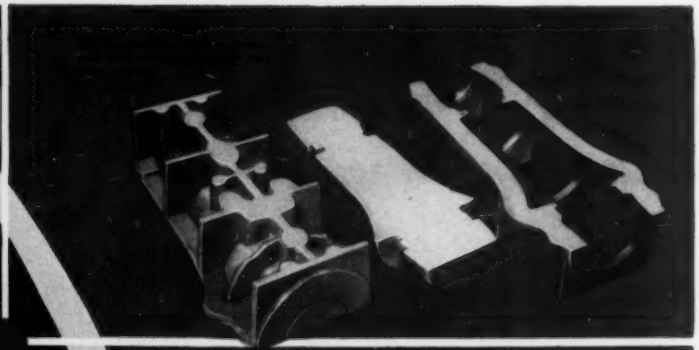
Type W Roto-Clone Arrangement A — cutaway showing how integral water sprays are combined with dynamic precipitation for high efficiency collection at low cost.

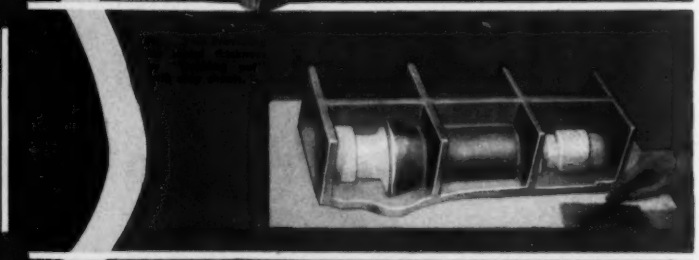
*ROTO-CLONE *is the trade-mark (Reg. U.S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.*

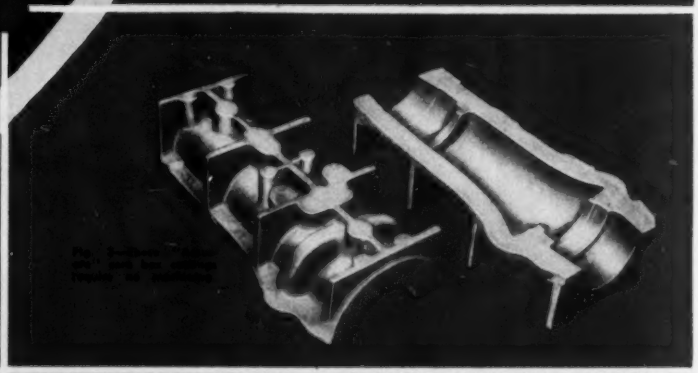
AAF

American Air Filter
COMPANY, INC.

104 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, California







SINGLE GANG SPLIT CORE BOX

ASSURES ACCURACY WITHOUT MACHINING

QUICK DELIVERY

By Air Freight, Parcel Post, Special Delivery or Railway Express. Pick-up and delivery by jobber representatives in the following areas:

- **AUBURN, MASS.**
  Henry A. Kottman
  Telephone: Auburn 2683
- **MILWAUKEE, WIS.**
  John M. Donohue
  Telephone: Hilltop 2-7130
- **NORMAL, ILL.**
  Clarence C. Schmidlin
  Telephone Normal 8551-5
- **LOS ANGELES, CALIF.**
  McGowan Company, Inc.
  Telephone: Trinity 2057

Split master core plug pattern and stock for frames are all that is necessary—for plaster molds used as a casting medium to ensure smooth, accurate castings. Large or small, single or multigang, you can substantially reduce your core box costs by using this pattern method.

Write for new illustrated book

1847 West Carroll Avenue
Chicago 12, Ill.
Telephone SE eley 3-7918

MATCH PLATE COMPANY

products and processes

For additional information, use postcard at bottom of this page

901 Vibrating table

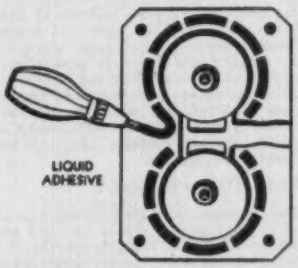
This device can be used for drawing cores and any other job requiring platform vibration. Intensity of vibration can be varied by a pressure control, permitting operation at 20 to 100 psi line pressure. Vibrator is fastened under the table and is controlled by a knee valve. Table top measures 12 x 18 x 1½ in., floats on heavy steel springs, and is 36 in. from the floor. Standard equipment includes air line filter, automatic lubricator, pressure control, and gauge. *Cleveland Vibrator Co.*

902 Core box bushings

Abrasive action of sand blown into core boxes soon wears the unprotected metal at and around the holes and at spots in the cavity directly below the holes. By inserting nylon bushings and striker pads, this abrasive action can be sharply reduced. Plugs and bushings can be easily machined from FM-10001 nylon rod. *The Polymer Corp.*

903 Adhesive bonding

Pyrobond is the trade name of an adhesive which can be used in bonding shell mold halves. Applied to the mold as a film or liquid and heat-cured, adhesive holds mold evenly and with great strength, eliminating need for clamps or bolts. Need for shot or silica-sand backing of most molds is also eliminated, solving most critical of the material-handling problems in shell molding process. Pyrobond film is laid between halves



while they still retain enough heat to cure the adhesive. Halves may then be removed from the pattern plates simultaneously. The liquid is used when halves are cured at different times. It is applied to the cold halves which are then placed in an oven long enough to cure the adhesive. Bonding adhesive disappears in shell-reclaiming process, eliminating problem of bolt or clamp removal. *World Bestos Co.*

904 Shot and grit tester

The Mattson-Cargill Shot Breakdown Tester, a bench-type machine, is used for subjecting shot or grit to repeated impact in a manner similar to that in production shot blasting machines. The useful life of the different shot samples is indicated by screening them through standard sieves after a standard length of time in the machine. It weighs 105 lb, is powered by a ¾ hp, 110 volt motor, operates automatically, and uses a 50-gram shot or grit sample. It is recommended for acceptance testing of shot as well as for laboratory tests. Time required to test conventional chilled iron shot is less than one minute. Weighing, loading, unloading, and screening takes about 5 minutes. Machine and the technique of operating it have received the tentative approval of the Shot Peening Div. of the SAE Iron and Steel Technical Committee. *Precision Shot Co.*

905 Cushioned lift truck

Weld-Bilt, a hydraulic lift truck, has a spring-suspended frame superimposed on the lifting frame, both raised by the hydraulic unit. Designed to cushion a wide variety of fragile loads, the truck is especially useful in foundry operations for handling green sand cores. Toggle-action equalizer on front wheels keeps load level on uneven surfaces. Truck comes in 7, 9, and 11 in. lowered heights with load capacities ranging from 2,000 to 6,000 lbs. *West Bend Equipment Corp.*

906 Self-propelled cranes

Truck cranes are now being produced in 7½- and 12-ton units equipped with air brakes, reversible steering, and fingertip controls. Air-assisted steering is optional. Cranes use gas-electric power, have turning circle of 40 ft. Automatic cut-out safeguards against overloading, reducing possibility of overturn or breakdown. *Coles Cranes, Inc.*

907 Masonry blades

Cutting of refractory bricks is simpler and safer with Tuffie, a reinforced masonry blade. Fabric reinforcement used

continued on page 102

Reader Service Dept.

52|9

Please send me detailed information on the Products and Processes and Free Foundry Information circled.

901 902 903 904 905 906 907 908

909 910 911 912 913 914 915 916

917 918 919 920 921 922 923 924

925 926 927 928 929 230 931 932

933 934 935 936 937 938 939 940

★ Please print or type information below

NAME

TITLE

COMPANY

ADDRESS

CITY AND ZONE

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 14680, Sec. 34.9 P. L. & R., CHICAGO, ILL.

Reader Service
AMERICAN FOUNDRYMAN
616 S. Michigan Avenue
Chicago 5, Illinois

free/foundry information

For additional information

use postcard at bottom of this page

917 ACCL directory

The 1952 revised edition of the American Council of Commercial Laboratories Directory is now available. It is a guide to the leading independent testing, research, and inspection facilities in this country. *American Council of Commercial Laboratories.*

918 Steel castings specs

Standard specifications for over 70 designated classes of steel castings are incorporated in a comprehensive summary chart intended to serve as a reference aid to engineers. Essential information included in simple tabular listings covers types of heat treatment, chemical compositions and mechanical properties, and test procedures. Special attention is paid to miscellaneous requirements, such as radiographic, magnetic particle, hydrostatic, and destructive testing. *Steel Founders' Society of America.*

919 Convertor refractories

Bulletin 242 contains a reprint of the article, "Convertor Refractories" by W. C. Cress, which originally appeared in A.F.S. TRANSACTIONS, Vol. 52, pp. 854-870 (1944). It also contains other information on foundry refractories. *American Colloid Co.*

920 Bucket teeth

Reversible and replaceable cutter for clamshell buckets is detailed in 4-page Bulletin 239. Tooth consists of a base which is permanently attached to the scoop, and a renewable tip which fits into a slot and wedges itself into the base. *Blaw-Knox Co.*

921 Crucible furnace

Four-page Bulletin C-101 features production comparison chart on a twin crucible furnace for copper, brass, bronze, aluminum, and other non-ferrous alloys. Furnace is the recuperative type, and is fired by gas or oil. Drawings show internal construction. *Morrison Industries, Inc.*

922 Mechanization items

Wide range of foundry equipment is described in 16-page Bulletin 25B0032C. Units include shakeouts, screens, motors, starters, and controls for sand conditioning systems; casting cleaning pumps; dry-coolers, pumps, reduction crushers, and vibrating screens for wet and thermal sand reclamation systems; cupola blowers; arc furnace controls and transformers; core dryers; and power generation and distribution equipment. *Allis-Chalmers Mfg. Co.*

923 Abrasive cutters

Full line of machines for abrasive wheel cutting are described and illustrated in 16-page, 3-color bulletin. Twenty-one photos cover units ranging from 3 to 20 hp. Machines will cut wet or dry, bevel or right-angle. Title of bulletin: "Tabor-brasive Cutoff Machines". *Tabor Mfg. Co.*

924 Core blowers

Excellent and complete bulletin on core blowers comprises 20 pages in 2 colors. Contents cover performance, operation, size range, choice of models, types of core sand that can be handled, and other salient specifications. Last few pages are devoted to installation photos of these machines in actual plants, with details of results. Bulletin number: CB-3. *Federal Foundry Supply Co.*

925 Pulley lagging

Small, 6-page folder gives salient data on pulley lagging, available in standard and waterproof grades. Lagging consists of a treated fabric and a special compound to stick it on. This eliminates heating, riveting, and bolting. Fabric may be plied on itself, making it possible to crown pulleys by applying several plies of different widths. *Condersite Engineering Corp.*

926 Melting furnaces

Two-chamber industrial melting furnaces are described and illustrated in 8-page Bulletin 560. Tables of capacity and dimensions and a list of typical applications are included. Operation of both stationary and tilting models is explained and illustrated. *Lindberg Engineering Co.*

927 Mulling data

Originally published several years ago by the Northern California Chapter of A.F.S., little booklet called "The Man at the Muller" is again available. It contains information valuable to most foundries, including the proper way to break in a new man and much technical data on the proper preparation of molding and core sands of all types. Ten full pages are devoted to typical sand mixtures for steel, iron, and non-ferrous castings. *National Engineering Co.*

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 14680, Sec. 34.9 P. L. & R., CHICAGO, Ill.

Reader Service

AMERICAN FOUNDRYMAN

616 S. Michigan Avenue

Chicago 5, Illinois

Reader Service Dept.

52|9

Please send me detailed information on the Products and Processes and Free Foundry information circled.

901	902	903	904	905	906	907	908
909	910	911	912	913	914	915	916
917	918	919	920	921	922	923	924
925	926	927	928	929	930	931	932
933	934	935	936	937	938	939	940

★ **Please print or type information below**

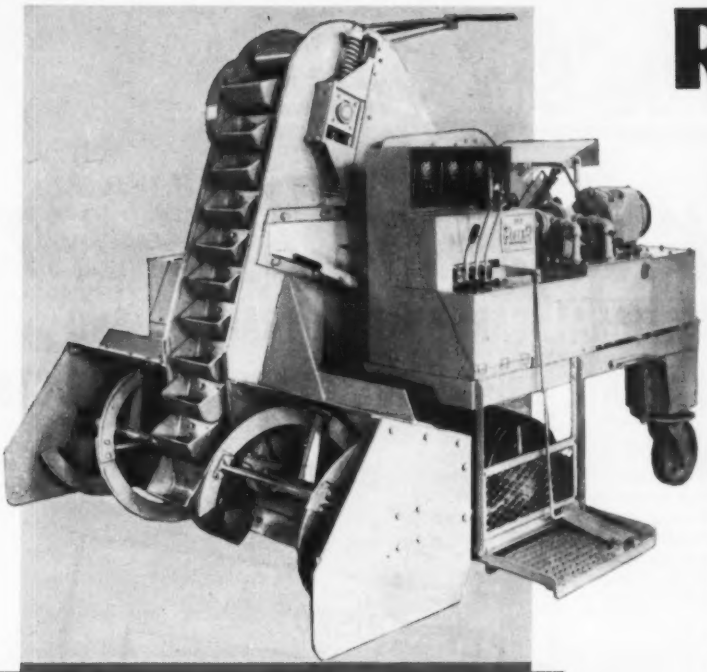
NAME

TITLE

COMPANY

ADDRESS

CITY AND ZONE



ROYER *Sand Hog*

for completely mechanized sand preparation self-loading—self-propelled

SPECIFICATIONS

Overall Dimensions

Height—Operating	7'5"
Height—Traveling	8'11"
Width	7'
Length—Operating	8'
Length—Traveling	8'8"

Power

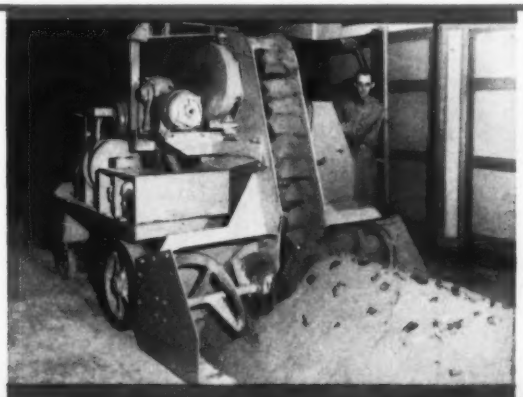
Total Horsepower	15 HP
Main Drive	5 HP
Bucket Line & Magnetic Pulley	5 HP
Royer Sand Separator	5 HP

Speed Range

Forward & Reverse Variable
0 to 15' per min. in low
65' to 85' per min. in high
Turning radius—5½'

Miscellaneous

24" diameter screw—7' wide.
Steel bucket line chain.
Flint rim bucket line sprockets.
Magnetic pulley—15" diameter
22" long
Net weight approx. 11,000 lbs.
Shipping weight approx. 11,300 lbs.



The new Royer SAND HOG eliminates the many costly hours of back-breaking labor ordinarily associated with sand conditioning...and at the same time supplies from 40 to 60 tons per hour of perfectly prepared sand, ready for the molders' use.

This one man operated, hydraulically powered machine moves into the sand heap, scoops up and completely conditions the sand and discharges it from the rear, free of all contamination. *Magnetic separation* removes all sizes of scrap, in many cases eliminating the need for riddling.

A further labor saving is made in doing away with costly sand handling and hauling . . . you can take the SAND HOG to the sand.

Extreme maneuverability is a feature of the SAND HOG . . . it can be turned in a 5½' radius, will travel over a 30" windrow of sand with the scraper and screw raised, operates in a wide range of speeds with instantaneous reversing.

Ask for further information on this newest labor saving equipment.

ROYER FOUNDRY & MACHINE CO.

155 PRINGLE ST., KINGSTON, PA.

Banish the "Bite"

ON PICKLING AND PLATING EQUIPMENT

with these NATIONAL (TRADE-MARK) CARBON AND GRAPHITE AND KARBATE (BRAND) IMPERVIOUS GRAPHITE PRODUCTS

Pickling and tinning are messy, expensive – and *necessary*. However, you can *greatly reduce* equipment maintenance costs and improve plant housekeeping by making full use of these National Carbon products wherever service is dirty and tough. As is well known by manufacturers of your pickling and plating *solutions*, only carbon and graphite and impervious graphite withstand the "bite" of so wide a range of corrosive chemicals.

HERE'S WHERE THEY'RE USED:

STAINLESS PICKLING

Carbon brick tank linings with "Karbate" Plate-Type Heat Exchangers and drain lines offer powerful resistance to nitric-hydrofluoric solutions.

ELECTROLYTIC PLATING

Graphite Anodes, either alone or in combination with dissolving-type anodes, are non-contaminating and long lasting.

Various immersion-type and shell-and-tube type "Karbate" Heat Exchangers are available to suit capacity requirements.

CARBON STEEL PICKLING

"Karbate" pumps and piping resist sulphuric and hydrochloric acid attack . . . protect solution from contamination.

"Karbate" Shell-and-Tube Heat Exchangers are often most economical where more than 50 square feet of heat transfer surface is required.

Graphite Tank Rolls provide an ideal combination of good electrical conductivity and resistance to acid attack in electrolytic pickling operations.

The terms "Karbate" and "National" are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, New York
District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
IN CANADA: National Carbon Limited, Montreal, Toronto, Winnipeg

WRITE FOR CATALOG SECTION—S-5005

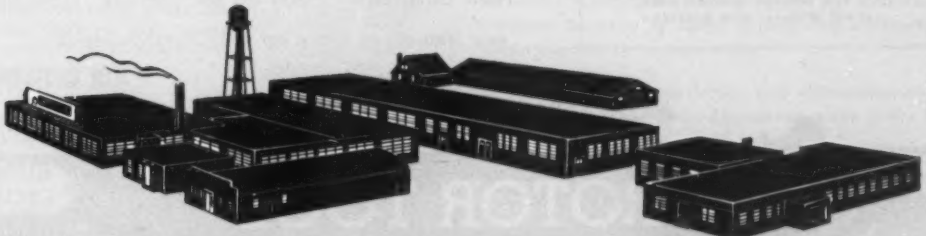
OTHER NATIONAL CARBON PRODUCTS

BLAST FURNACE LININGS • BRICK • CINDER NOTCH LINERS • CINDER NOTCH PLUGS • SKIMMER BLOCKS • SPLASH PLATES • RUNOUT TROUGH LINERS • MOLD PLUGS • TANK HEATERS

UNIVERSAL flask pins and bushings are typical of the quality products that have helped to build Universal's Frankenmuth plant

Universal Flask Pins and Bushings are heat-treated and precision ground from finest quality steels. They will save you precious minutes of production time by assuring instant, accurate alignment of cope and drag. Universal Flask Pins and Bushings will give you long, satisfactory service and they will stand up under extremely rough treatment, thus saving you the additional cost and down-time that replacement always requires. Universal Flask Pins and Bushings are typical of the quality products being produced at the big, modern plant of the Universal Engineering Company in Frankenmuth, Michigan.

The modern home of finer production tools



UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 12, MICHIGAN

THE NEW B-35

Weight	10¾ lbs.
Height	7½ inches
Spindle	⅜" - 11"
6000 - 5500 - 4500 - 3500 RPM	

THE NEW B-12

Weight	10 lbs.
Height	7 inches
Spindle	⅜" - 11"
6000 - 5500 - 4500 - 3500 RPM	

For cup wheels, sanding pads, cut-off wheels, wire brushing.

Never Before!!

...SO MUCH POWER PER POUND

MEET the new Rotor Vertical Air Grinders! Never before have you had so much power in vertical air grinders...for such light weight! They're well balanced . . . easy on the operator. Here are *new* features to speed up your metal removal.

AIR O'TOOL

WRITE TODAY FOR BULLETIN No. 40.

AIR

THE ROTOR TOOL CO.

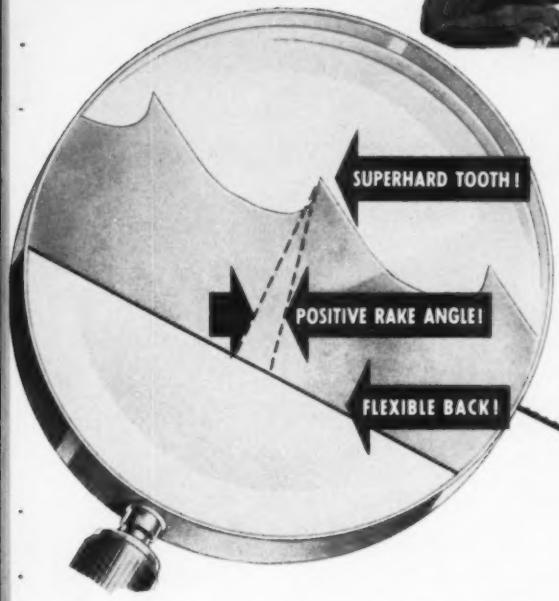
CLEVELAND, OHIO

HIGH CYCLE

NEW!

DoALL CLAW TOOTH SAW BAND...

FOR METALS, WOODS, PLASTICS
EXTRA FAST CUTTING,
EXTRA LONG LIFE



Widths from ¼" to 1½". 2, 3, 4 and 6 pitch, depending on width.

NOW, for the first time, in the DoALL Claw Tooth saw band, mass production of a blade combining a *positive rake angle, hardened teeth* and a *flexible back* has been achieved.

Faster, free cutting with less feed pressure results from the hooked, claw-like teeth which actually "pull" into the material being sawed.

The superhard teeth give longer blade life with substantially higher cutting efficiency up to time of replacement than that of non-hardened blades which must be resharpened periodically.

The result is a blade that industry has been waiting for—a blade that reduces bandsawing costs and increases production when properly applied.

Ask for Literature

Complete information, prices, specifications available upon request. Call your local DoALL Sales-Service Store or write:

THE DoALL COMPANY
254 N. Laurel Ave., Des Plaines, Ill.

Eliminates Resharpening and Resetting—**it's cheaper to replace long-lived Claw Tooth blades than to use blades which must be resharpened a number of times during their life.**

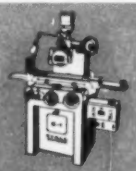
Increases Production — **more output per machine and manhour because of faster cutting and elimination of blade removal for resharpening.**

Cuts Costs—**higher production and elimination of blade maintenance labor and equipment means lower bandsawing costs.**

DoALL

SB-16

BAND MACHINES



SURFACE GRINDERS

GAGE BLOCKS

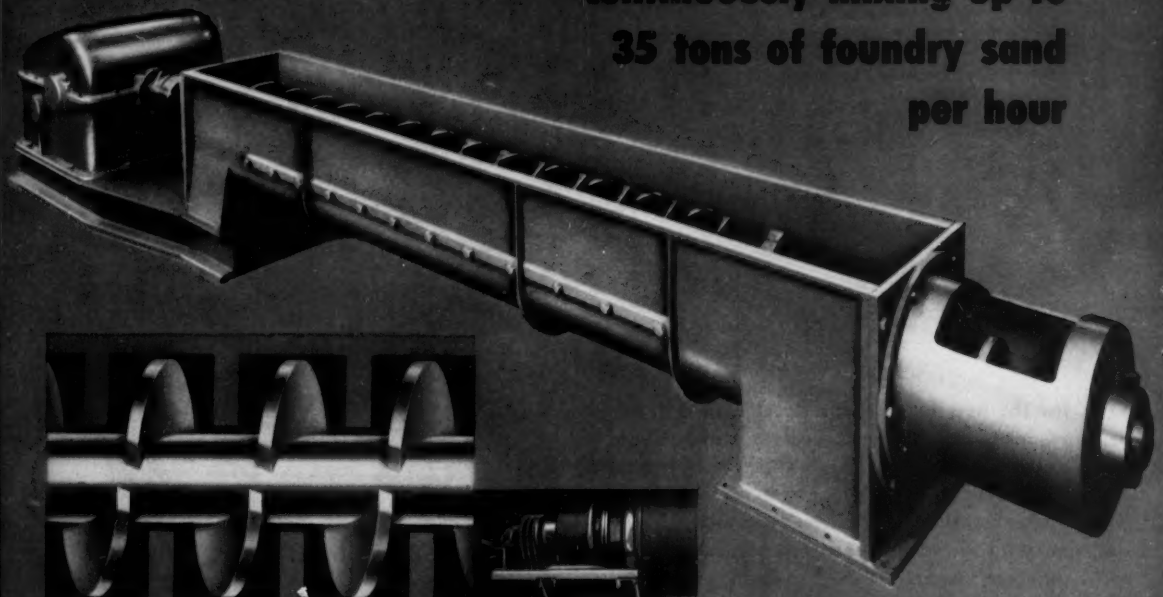
GAGING EQUIPMENT

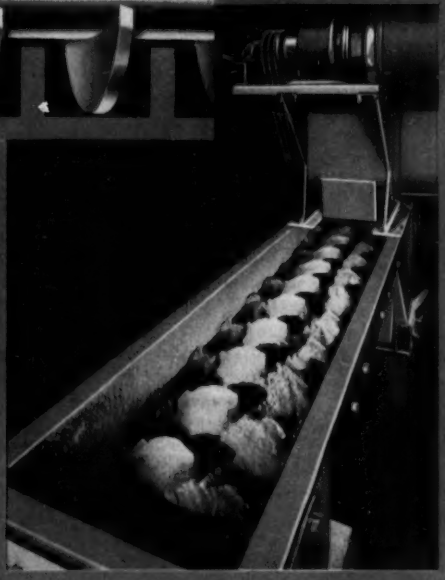
MOBILE INSPECTION UNITS

Baker Perkins Ko-Kneader

(LIST SYSTEM)

an efficient new unit for continuously mixing up to 35 tons of foundry sand per hour





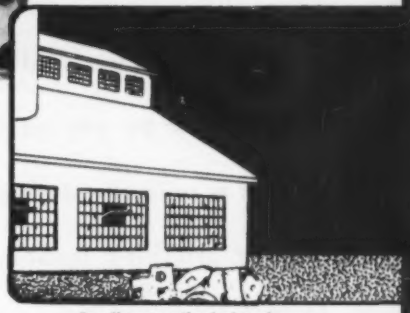
B-P Ko-Kneader in operation handling foundry sand

With revolutionary Baker Perkins Type M List System Ko-Kneaders, continuous mixing of foundry sand becomes a highly practical operation. Essentially, the Ko-Kneader is a mixing worm revolving as well as reciprocating in a trough provided with kneading teeth in such a way that the mixing worm works as a single mixing machine with each tooth. The repetition of this operation, as the sand moves along the trough, completes the mixing and mulling. Baker Perkins Ko-Kneaders save considerable mulling time and also help to improve casting quality because the intense mixing action blends the sand uniformly and thoroughly. Baker Perkins Ko-Kneaders are ruggedly built for long life and dependable service. When used with specially designed Baker Perkins Feeders, operation of the Ko-Kneader is almost entirely automatic, resulting in substantial savings in labor costs. Consult a Baker Perkins sales engineer or write today for complete information.

BAKER PERKINS INC. foundry equipment sales • saginaw, michigan

SCRAP CAN EASILY BE MINIMIZED

Large scrap pile before using Famous Cornell Cupola Flux



Small scrap pile during the use of Famous Cornell Cupola Flux.

MOST OF YOUR PRESENT CASTING SCRAP RATE CAN BE AVOIDED—TIME AND LABOR SAVED—BY CLEANSING AND CONDITIONING MOLTEN IRON WITH —

Famous CORNELL CUPOLA FLUX

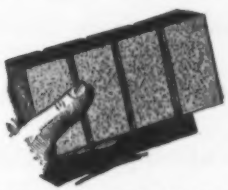
The purging action of Famous Cornell Cupola Flux has a record of more than thirty-four years' success in casting improvement and is endorsed by leading foundries throughout United States and Canada.

The molten iron is hotter, more fluid, sulphur is greatly reduced and slag is kept fluid.

You pour castings that are sounder, more even in grain, tougher and cleaner. Machining is easier, smoother and faster.

FAMOUS CORNELL CUPOLA FLUX PAYS ANOTHER IMPORTANT DIVIDEND, TOO. It keeps cupolas cleaner, bridging over is practically eliminated, drops are cleaner and erosion of lining is reduced due to a glazed or vitrified surface which is formed on brick or stone—*all this adds up to greatly reduced maintenance cost and down time.*

WRITE FOR BULLETIN NO. 46-B.



Pre-measured scored brick form
(Approx. 4 pound brick)

It takes but a few seconds and practically no labor to use Famous Cornell Cupola Flux. You simply lift it out of container and toss it into cupola in the amount recommended for each ton charge of iron, or break off one to three briquettes (quarter sections) for smaller charges, as per instructions.

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Brass contains no metal after this flux is used.

PIG IRON SUPPLY TIGHT?

THEN SWITCH TO

MEXITE® BRIQUETTES

FOR CARBON CONTROL IN THE CUPOLA

Replace carbon usually provided by pig iron. Supply a uniform steady source of graphitic carbon. Enable better castings to be poured from 100% scrap charges. Raise carbon, thus reducing chill, shrinkage and hardness . . . increase fluidity and machinability. Easy to use.

139-A

THE UNITED STATES GRAPHITE COMPANY

Division of The Wickes Corporation • Saginaw, Michigan

Foundrymen in the news

Dr. Oscar A. Sander, industrial medical consultant, Milwaukee, whose paper *"The Truth About Disease Caused by Foundry Dust"* appears in this issue (page 53) was introduced during the Foundry Health Conference at the University of Michigan earlier this year as the man who has done most to separate fact from fiction in the field of dust-caused diseases in the foundry. Starting December 1932 he conducted a large-scale survey of Wisconsin workers in numerous trades and since that time has interpreted upwards of 300,000 chest x-rays of which about 50,000 have been periodic checks on workers still exposed to dust. Some 1,000 of these have varying degrees of silicosis and are still working in their trades.

Martin G. Dietl's work as foundry production engineer for Schaible Co., Cincinnati, is evident in his paper on nonferrous cleaning room layout which starts on page 44. Before going to Cincinnatti about a year ago, he had been employed by Crane Co., Chicago, where

Martin G. Dietl

he started after graduation from Newark College of Engineering in 1938. While melting foreman for Crane he wrote *"Problem of Gases in the Indirect-Arc Furnace"* which appeared in the April 1949 issue of AMERICAN FOUNDRYMAN.

Hiram Brown easily lives up to the standards he sets in *"Are Technical Graduates Getting Adequate Training in College?"* (page 56). Now chief metallurgist for Solar Aircraft Co., Des Moines, Iowa, he has also worked for Aluminum Company of America in Cleveland and Detroit, Aluminum Industries, Inc., Cincinnati, and Frontier Bronze Corp., Niagara Falls, N. Y. In addition to graduating with honors in metallurgy from Fenn College, he took many liberal arts subjects with emphasis on journalism. One of the country's top metallurgists in light metals and jet aircraft alloys, he has long been known for his many technical talks and papers, and for his book, *Aluminum and Its Applications.* Less well known is the fact that he is also a fiction writer. His work in technical societies is typified by his long association with A.F.S. where he is chairman of the Light Metals Division.

Hiram Brown

Roger W. Griswold, foundry engineer at Erie Malleable Iron Co., Erie, Pa., is author of *"The Job Record Card, a Valuable Tool for the Jobbing Foundry"* starting on page 34. He was the founder and first chairman of the Northwestern Pennsylvania Chapter of A.F.S. and has continued to be active in its work. He was formerly with Griswold Mfg. Co., Erie.

Morris and **Xarifa Bean,** of Morris Bean & Co., Yellow Springs, Ohio, received the 24th and 25th honorary degrees in Antioch College's 99-year history at commencement ceremonies June 21. They are the first husband-and-wife team to be so honored. Both are Antioch graduates. They were named honorary doctors of science and cited for their outstanding contribution in the advancement of precision metal casting. They were also cited for using their scientific training in developing an industry based on craftsmanship into one that applied the scientific method and engineering principles.

R. A. Heindl, author of the paper on foundry crucible life on page 40, is chief of the refractories section of the National Bureau of Standards. With the Bureau since 1923, he has been in the field of abrasives and refractories since graduation from George Washington University in 1917 when he started as research chemist for Carborundum Co. During the next six years he worked for Carborundum, for Aluminum Company of America, and for International Abrasive Co. His talks and papers on ceramics are numerous and he has participated actively in the work of the American Ceramics Society and ASTM.

R. A. Heindl

William J. Martin, Jr., has been transferred from the Cincinnati office to the Cleveland office of Peninsular Grinding Wheel Sales Corp.

Julius F. Mueller left New York for Brazil July 10 to take a position as foundry consultant with S/A Comercio e Industrias "Souza Noschese", Sao Paulo. He will remain in South America one to three years. A 50-year veteran of the foundry industry, 42 of which he spent with Universal-Rundle Corp., Milwaukee, he is believed to be the first man to use a slinger for molding

Harvey T. Harrison, Duraloy Co., Scottdale, Pa., was re-elected president of the Alloy Casting Institute at the 12th annual convention in Hot Springs, Va. New vice-president is **G. A. Baker,** Duriron Co., Dayton, Ohio. **C. M. Carmichael,** Stainless Steel & Alloys Div., Shawinigan Chemicals Ltd., Montreal, Que., Canada, and **M. N. Ornitz,** National Alloys Steel Div., Blaw-Knox Co., Pittsburgh, are new directors.

At the convention, institute members heard research reports on projects sponsored at Battelle Memorial Institute and Ohio State University, both at Columbus, Ohio, in substitution of titanium for columbium in cast stainless steels, in strength and fatigue at elevated temperatures, and resistance to corrosion by neutral heat treating salts. Also

reported was research at Massachusetts Institute of Technology, Cambridge, Mass., devoted to improvement of surfaces on high alloy castings.

J. A. Handley, formerly vice-president and chief executive officer of Whiting Corp., Harvey, Ill., has been elected president and director of the corporation. Also named a director was **Boyd N. Everett,** a director of Black, Sivalls, and Bryson, Inc., Kansas City, Mo., and vice-president and treasurer of Continental Casualty Co. and Continental Assurance Co. The following directors were re-elected: **Stevens H. Hammond, Thomas L. Hammond, J. Clyde Thomas, John B. Dunbar,** and **Frederick M. Gillies.** Following the annual stockholders meeting the board of directors elected the following officers, in addition to President Handley: Stevens H. Hammond, chairman of the board; **M. J. Rice,** vice-president in charge of engineering; **G. E. Seavoy,** vice-president in charge of sales; Thomas L. Hammond, vice-president; J. Clyde Thomas, treasurer and secretary; **Frank O. Krumm,** controller and assistant secretary; **Robert S. Hammond,** vice-president in charge of Chicago office; and **Dan Polderman, Jr.,** vice-president and director of export sales.

J. A. Handley

Augustine R. Marusi has been appointed vice-president in charge of development of Borden Company's Chemical Div., New York. He has been director-superintendent of Alba, S.A., a subsidiary of the division in Sao Paulo, Brazil.

A. E. Bottenfield, recently vice-president in charge of distributor sales, Whiting Corp., Harvey, Ill., has been elected a vice-president of Waldie and Briggs Inc., Chicago advertising agency.

George F. Pettinos, Sr., president of George F. Pettinos, Inc., Philadelphia, celebrates his 90th birthday on September 20 and his 60th anniversary as active head of the company he founded in 1892 to supply industry with industrial sand and graphite products. Born in San Francisco, he graduated from Lehigh University as a mechanical engineer in 1887, and was employed by the predecessor of Bethlehem Steel Corp. as chief engineer for five years before forming his own company. He is president of Bridgeton Sand Co., Cape May Sand & Gravel Co., Reading Sand Co., A. T. Harris Sand Co., Pettinos New England, Inc., George F. Pettinos (Canada) Ltd., Keystone Parting Co., and Sonnittep Transportation Co. He has been associated with A.F.S. since its founding in 1896.

Thomas S. McEwan

Thomas S. McEwan has been appointed a vice-president of Lester B. Knight & Associates, Inc., Chicago. He was formerly resident manager engineer of Stevenson, Jordan & Harrison, vice-president of McClure, Hadden & Ortman, Inc., and a partner in Wolf Management Engineering Co. In 1941-42 he served in Chicago as first regional director, War Production Board.

Donald K. Schleiffarath is the new representative for Chas. Taylor Sons Co., a subsidiary of National Lead Co., Cincinnati. His territory covers Missouri, Kansas, Oklahoma, and southern Illinois.

Verne Pulsifer, chief metallurgist for Olin Industries, Alton, Ill., has been appointed a supervisor in the metals department at Armour Research Foundation of Illinois Institute of Technology, Chicago. He will supervise heat treatment and application metallurgy. IIT has also appointed **Frank A. Crossley,** head of the Foundry Engineering Dept. at Tennessee A. & I. University, Nashville, to the position of associate metallurgist.

C. Manning Davis has been appointed head of the analytical section of the research laboratory, International Nickel Co., Bayonne, N. J. He was previously at Mellon Institute for Industrial Research, Pittsburgh, and Fisher Scientific Co., Pittsburgh.

Robert W. Suman has been appointed by Link-Belt Co., Chicago, to assume the job of chief engineer for their new Colmar, Pa., plant. **Norman Virkler** takes over Mr. Suman's old job as chief engineer for the Philadelphia plant. Colmar plant is still under construction and is scheduled to begin manufacturing operations later this year.

Horace A. Deane has been elected a vice-president of Campbell, Wyant and Cannon Foundry Co., Muskegon, Mich. He had been operating vice-president of Brake Shoe & Castings Div., American Brake Shoe Co., since 1945. Associated with Brake Shoe for 13 years, he had previously been assistant chief metallurgist of Deere & Co. foundries. Mr. Deane was a national director of A.F.S. (1946-49), chairman of the Quad Cities Chapter and the Metropolitan Chapter, and chairman of the Tri-Cities Chapter of the American Society for Metals.

Horace A. Deane

John P. Burrows has been appointed general purchasing agent of International Minerals & Chemical Corp., Chicago. Assistant purchasing agent since 1944, he joined the company in 1933 as an engineer. He succeeds Joseph M. Coppinger who died June 19. **William Adams,** formerly of Albion Malleable Iron Co., Albion, Mich., has joined the Eastern Clay Products Dept. of International Minerals & Chemical Corp. as sales engineer. He will service refractory and bonding clay users in Michigan.

Adrian Archambault is the new Michigan sales representative for Indiana Products Co., Kokomo, Ind. He spent 9 years with Grede Foundries, Inc., Milwaukee, 8 years with the Wisconsin Board of Vocational & Adult Education teaching foundry apprentices, and 4 years with Hackley Manual Training School, Muskegon, Mich., in charge of the Foundry Dept.

Thomas W. Russell, Jr., has been appointed general purchasing agent of American Brake Shoe Co., New York, and **Thomas J. Wood** has been appointed operating assistant to the president of of the company's Brake Shoe & Castings Div., while **Raymond A. Frick** has been named general works manager of the division. Mr. Russell joined Brake

continued on page 83

VOLCLAY BENTONITE

NEWS LETTER No. 29

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE

"If Your Sand won't Flow... Your Production is Low... and Casting Shipments Slow..."

Are you experiencing high maintenance costs? Are you troubled by molding sands sticking in the hoppers? Are you plagued by having elevators, conveyors and other units clogging?

Why lose a molder's valuable time when he must pound and beat hoppers for molding sand when a more flowable bonding agent can be supplied to increase the molder's production?

A good workable sand mixture is one that allows the less skilled molder to make good molds. Therefore, more common labor may be employed.

An "off-grade" molding sand can cause much labor dissension.

Foundries are wisely becoming acquainted with the importance of decreasing the laborious job of hard ramming to fill the mold and then the unnecessary butting, jolting and peening of the sand mixture in the flask to force it around the pattern.

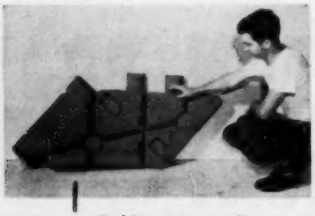
A bonding material that is "too stiff" requires many lost labor minutes and valuable hours at the molding machine. If an operator must "force" the stiff sand mixture around the pattern, molding costs certainly are going to increase.

A flowable sand decreases this maintenance cost, and a flowable sand passes quickly toward the discharge end of the unit as there is less binding and sticking in the mechanized unit.

A pattern is manufactured to insure closer dimensional accuracy, why not prepare a sand mixture which has good flowability and properly fits itself around the pattern when rammed or jolted? Tolerance may then be held to a rigid specification. A mold which is properly rammed also properly strips from the pattern with good clean surfaces. **Panther Creek bentonite provides high flowability to a molding sand mixture, allows less bond to be used, thus less temper water is required, sand will flow, the production will increase, and casting shipments will increase.**

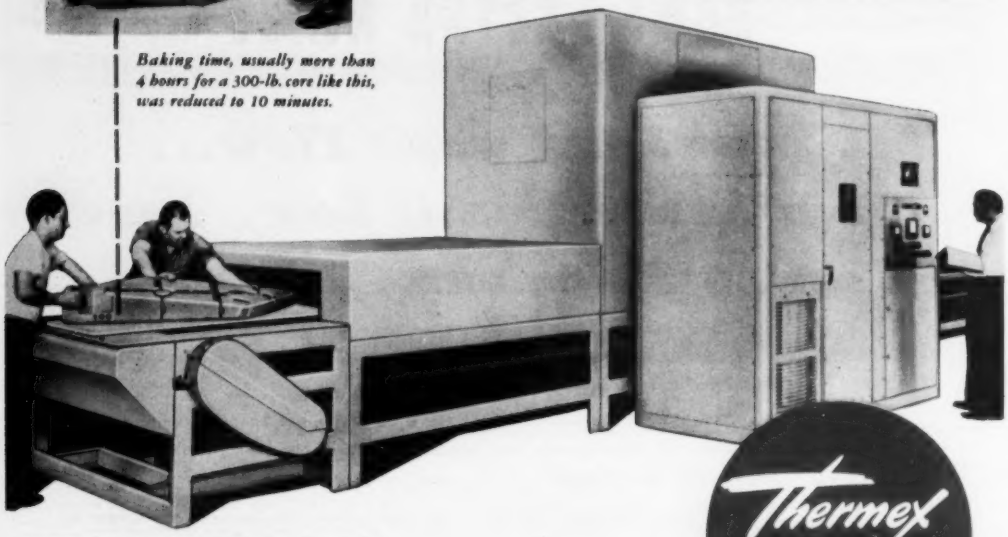
AMERICAN COLLOID COMPANY

Chicago 54, Illinois • ***Producers of Volclay and Panther Creek Bentonite***



Baking time, usually more than 4 hours for a 300-lb. core like this, was reduced to 10 minutes.

300-lb. core baked in 10 minutes!



Partial List of Companies Who Have Purchased Thermex Electronic Core-Baking Equipment

Albert Lea Foundry Co.
American Brake Shoe Company
American Hardware Corporation
American Valve Co.
Atlantic Steel Castings Co.
Ph. Bonvillain & E. Ronceray
Boose Aluminum Co.
Brugger Mfg. Company
Cadillac Malleable Co.
James B. Clow & Sons
Crane Company
Drake Non-Clinkering Furnace Block Co., Inc.
Ford Motor Company.
Fundicao Tupy
Grand Haven Brass Foundry
Grinnell Corporation
International Harvester Co., Ltd.
McWane Cast Iron Pipe Co.
Moline Malleable Iron Company
Mueller Company
National Malleable & Steel Castings Company
Ontario Malleable Iron Co., Ltd.
Phoenix Brass Fittings Corp.
Repcal Brass Mfg. Co.
Rolle Manufacturing Co., Inc.
Ronci Company, Inc.
Sterling-Faucet Company
U. S. Pipe & Foundry Company
Walworth Company

BIG OR SMALL . . . this THERMEX* Core-baking Unit takes them all in stride at a rated capacity of 3500 pounds per hour. Speed . . . the factor that cuts costs, increases profits and brings in business is the outstanding advantage of this big, versatile core baking unit.

Foundries using THERMEX Core-baking Equipment report greater core room yields, since rejects are sharply reduced. Castings have fewer irregularities. Uniform heating eliminates stresses, and greatly improves dimensional stability.

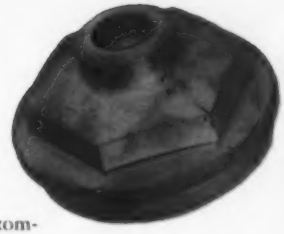
Take advantage of this cost-cutting equipment *now*. Let a Thermex field engineer study your operations, and make recommendations. Write The Girdler Corporation, Thermex Division, Louisville 1, Kentucky.

*THERMEX - Trade Mark Reg. U.S. Pat. Off.

The GIRDLER Corporation
THERMEX DIVISION

SHELL MOLDING

with BAKELITE Phenolic Resins offers 2-way benefits



Shell Molding can help you set new production records. Your customers, the users of ferrous and non-ferrous castings, profit too. The process utilizes smooth, lightweight, thin shell molds made of fine-grained sands bonded with BAKELITE Phenolic Resins. Here are some of its many advantages:

How Foundries Benefit:

- More good castings per ton of metal poured.
- Finished molds can be stored until needed.
- Ninety to ninety-five per cent less sand is used.
- Molds are easily handled and moved about.
- Laborious surface finishing of castings is reduced.

How Users Benefit:

- Castings have almost pattern-smooth surfaces.
- Pieces are cast to closer finished dimensions—tolerances as close as .003 to .005 inches per inch.
- Higher percentage of sound, uniform castings means fewer rejects.
- Better detail minimizes machining operations.

Data courtesy Walworth Company, New York 17, N. Y.

BAKELITE
TRADE-MARK
PHENOLIC BONDING RESINS

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.
In Canada:
Bakelite Company (Canada) Ltd., Belleville, Ont.

Learn More About This Process Now: Mail The Coupon Today!

BAKELITE COMPANY, Dept. 2F-39.
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.
Please mail my free copy of the Booklet C-8, "BAKELITE Phenolic Resins for the Shell Molding Process."

*Name*_____ *Title*_____
*Company*_____
*Street*_____ *City*_____ *Zone*____ *State*_____

for CONSISTENT HIGH QUALITY SHELL PRODUCTION...

break in patterns with DOW CORNING 7 COMPOUND

Always break in new or freshly cleaned shell mold patterns with Dow Corning 7 Compound. Simply rub it on and heat the pattern briefly. Deep-section or highly complex plates may require a second or third treatment. The most effective parting agent known for shell molding, Dow Corning 7 Compound forms a continuous, semi-permanent coating which conditions the pattern and helps assure clean, easy release and smooth, uninterrupted production of even the most intricate shells.

spray every cycle with DOW CORNING 7 EMULSION

Speed production by spraying every cycle with Dow Corning 7 Emulsion. Easier and safer to apply than solvent dispersions of the Compound, the Emulsion may be diluted with water to any desired working concentration. Formulated especially for the shell process, it is non-corrosive to metals and leaves minimum build-up. With only occasional agitation, it is sufficiently stable after dilution to allow a day's supply to be made up in advance.

Send Today!

For Free Samples of Dow Corning 7 Compound or Dow Corning 7 Emulsion or write Dept. AV-21 for Data Sheet.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

ATLANTA • CHICAGO • CLEVELAND • DALLAS • LOS ANGELES • NEW YORK • WASHINGTON, D.C.
In Canada: Fiberglas Canada, Ltd., Toronto • In Great Britain: Midland Silicones, Ltd.

DOW CORNING SILICONES

How we achieve high productivity . . .

■ A glimpse of ourselves as others see us is contained in *Foundry Trade Journal's* story on the United Kingdom delegates who attended the International Foundry Congress and who participated in the foundry tours for overseas visitors. The team concluded that high productivity in United States foundries is largely due to personal relations between management and labor, between different levels of management, to training of supervisors, and to the large number of foremen employed.

The team of Britons "noted that American promotion is based much more strictly upon merit and practical ability than is frequently the European custom."

Similar observations were made by the Productivity Team from Denmark which visited iron and steel foundries in the United States last year and reported that "at all the places visited the managing staff had an intimate knowledge of their works. Several members of the managing staff had started at the bottom rung of the ladder and had worked their way up as foremen, head foremen, foundry superintendents, and were now managing directors."

The Danish team was also impressed with the pace ("Competition is hard all over America") but felt that the chance to get ahead was a powerful incentive throughout the industry.

Factors which make American foundries approximately twice as productive as Danish shops, team members decided, were:

1. Efficient management.
2. Good planning.
3. Larger investments.
4. Mechanical facilities.
5. First-rate patterns.
6. Repair and upkeep.
7. Specialization.
8. Size.
9. High, constant work capacity.
10. Research work and technical instruction by supply firms.

Danish team members did not overlook the A.F.S. research program, about which they wrote: "The results of the research are published, and thus we are also able to gain thereby." Impressed with opportunities for learning through A.F.S. meetings, they reported "that the American Foundrymen's Society had branches all over the country and especially in the large foundry towns. Here meetings were held every month from September till May, and every year at the end of April or at the beginning of May an annual meeting for the whole country is held, every other combined with a great exhibition.

"It is self-evident that considering the huge extent of the foundry industry in the United States they have every possibility of engaging the best qualified lecturers for these meetings and that the meetings are of great value to the founding technicians in helping them keep abreast of the developments in their field."

The job record card, a valuable tool for the jobbing foundry

In a jobbing foundry, it is next to impossible for supervisors to remember all the details connected with making a job successfully with a minimum of scrap. It is particularly difficult in the case of jobs which may be ordered periodically, perhaps once or twice a year. This recording system, perfected after considerable trial and error, furnishes enough data to prepare any job for production and run it the same way every time without omitting some small but critical step that brings high loss.

R. W. GRISWOLD / *Foundry Engineer, Erie Malleable Iron Co., Erie, Pa.*

■ Administration of a suitable job recording system is a part-time function of a man on the foundry staff, the Job Record Supervisor. Looking after the records and filling in the cards is the Job Record Man (or Recorder), who works full time and is responsible to the supervisor.

It is important that the recorder possess the talent to separate the imporant from the unimportant in developing job records; a background in timestudy work is very helpful. The ability to get cooperation is equally vital, since it is frequently difficult to find out the important steps in making a job.

Job record work should have no connection whatsoever with timestudy and rate setting, and this distinction should be clearly established at the outset. Suspicion of any such connection can be a serious stumbling block in obtaining job information, particularly "tricks of the trade".

The two principal records are the Job Record Card (Fig. 2 and 3) and the Job Record Log. The latter consists of running records on each job, describing in detail troubles which occurred, samples made, experiments conducted, customer reports, and reasons for changes or additions to the cards.

Logs are kept in loose leaf binders. Frequently a log is kept on a job for a considerable length of time before a card is written, and this log supplies basic data to be put in it. In short, the log is the master record.

Preparing the cards

The recorder fills in the card while watching the job being made. Special effort is made to get records of jobs which are troublesome or tricky, if possible while they are running well with low scrap. Jobs are usually selected on the advice of foundry foremen, or on the basis of logs or scrap records.

After the casting inspection, the recorder checks the scrap and enters the date, total pieces made, total pieces scrap, and principal cause of scrap in the lower left hand corner of the back of the card. He discusses the record with the foreman and gets any pertinent information he may have missed.

After the molding foreman approves the completed card, it is hand-printed for legibility and submitted to the supervisor. A note is made in the log that a card has been completed and issued. Then the card is turned over to the production department, whose responsibility is to keep it in the active file in the pattern storage office. The pattern storage record for the job is marked "JR" to indicate that a card exists.

Sometimes the question arises whether to use the card due to high scrap or other abnormality present while the card was being made. This is usually answered by deciding whether use of the card will avoid a recurrence of the trouble. In general, if total scrap is under 10 per cent or if cause of excess scrap and its proper correction are definitely known, the card is used.

Otherwise a record is not obtained until the trouble is corrected. If there is to be a lapse of time before the job is run again, a temporary, incomplete card is issued with an explanation of the difficulty and the notification to warn the recorder when the job is run again.

Use of record cards

When the production order reaches pattern storage, the man in charge checks the storage record card to locate the pattern; if the stor-

DATE OF REPORT _____

DATE CASTING MADE _____

Job Record Card Performance - Check up on Jobs Running with Cards

Molder Number	Pattern Number	Total Pieces	Total Scrap	Scrap Cause	Pieces Scrap	Listed on JR Card?	Put on JR Card	Comments

Fig. 1 . . . Headings of the Job Record Card Performance Sheet, on which are listed actual results of using the information provided by the Job Record Cards. This serves as a good check on the effectiveness of the system; excess scrap showing up here is a significant indication that data on the cards is either incorrect or incomplete.

age card has a "JR" designation on it, the job record card is taken from the file, and put in a transparent envelope, and placed with the pattern when it is sent to be prepared for running.

The card accompanies the pattern to the foundry and remains at the molder's station where it should be hung up next to his machine. After the production run is over, the card returns to storage with the pattern. Cards are put in a return box; the pattern storage man gets them daily, removes their envelopes, and refiles them in their proper place.

This routine is slightly modified for cope and drag jobs, which generally take more planning and preparation. A weekly meeting is held to discuss the production schedule, at which time the foremen pick out the cards for the jobs they will supervise. When a job "goes into the sand" the foreman takes the card to the foundry. When it is out, he leaves it in the return box at pattern storage.

For sprueing and cleaning operations, the foremen in charge look at the cards at the molder's station and are guided by the information they thus obtain.

To derive maximum benefit from the cards, the molding foreman should refer to them when jobs are being flasked up, when they are being readied at the molding station, and when the first molds are made. It also pays to check the operations periodically. Accessibility of the cards is the most vital factor in the entire system.

Changing the cards

It often requires considerable judgement to decide whether changes or additions to job record cards are justified. Changes should not be made for difficulties caused by some temporary variation of sand or metal or other basic factor. However, if a job is susceptible to scrap from such variations, a notation should be made explaining what to look out for and what to do about the situation.

There is admittedly often more than one way to make a job, but it would be impractical to cover them all on a card. The effort is made to provide a card that explains one way the job has been made successfully, so that a reliable method exists to fall back on if other methods are substituted only to fail.

If a foreman finds that a change or addition is necessary, he contacts the recorder who gets the complete story

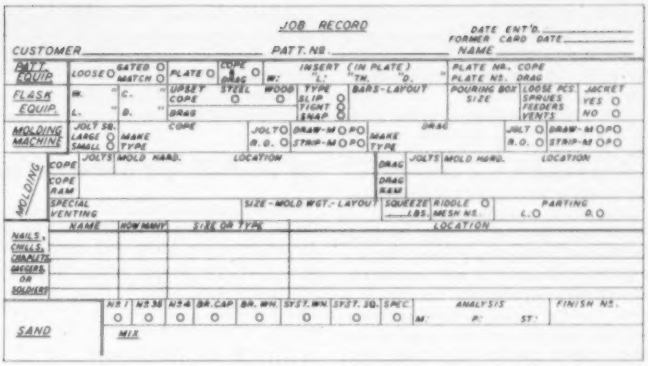


Fig. 2 . . . Front of the Job Record Card. Under Molding Machine, *M* means manual and *P* means power; under Parting, *L* means liquid and *D* means dry.

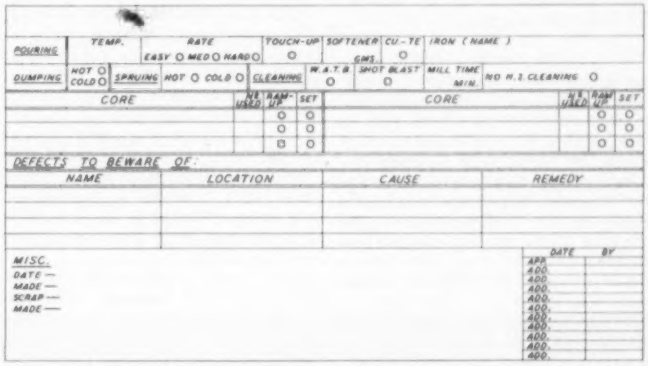


Fig. 3 . . . Back of the Job Record Card contains additional information. Under Cleaning, *W.A.T.B.* refers to use of a centrifugal blast cleaning machine.

CUSTOMER			PATTERN NUMBER	
Date-	Card Number-		Of-	Where Made-
Box	Plate	Sand	Coremaking	Finishing

Fig. 4 . . . Front of the Core Job Record Card. Column headed "Plate" should contain the number of the blow plate used on the job. Back of the card contains specific data on cleaning and pasting as well as special instructions.

before touching the card. Scrap is checked to make sure the change is proving out all right. He then submits the changed card to the supervisor for approval.

If the recorder questions the value of the change, he discusses it with the supervisor, who may make a further examination and bring the matter to the attention of his superiors.

After the change or addition is made on the card, the recorder makes an explanatory entry on the log. Then the card is returned to the production department for use. If a new card is made to supercede the one already in use, the reasons are also noted on the log. Old cards should be promptly removed from the active file and placed in a special file of their own.

Checks the scrap

In order to get the cards as complete as possible, the recorder makes a daily check of scrap reports and looks over scrap castings to pick up any additional information that might be useful. The foremen are consulted on this before the cards are changed. A periodic checkup is made on the performance of jobs running with cards. All are listed on a sheet (Fig. 1) along with pieces made, scrap, and whether the defect was listed on the card. This check-up gives an idea of whether the cards are helping prevent scrap.

Sampling

Occasionally trouble is found after the run on a job is completed, or as the result of a customer's complaint. If cause and correction are not definitely known, the recorder clips a note to the card calling attention to the trouble; details are listed in the log. Several courses of action are open in this case.

The ideal way is to make an immediate correction and sample the job if advisable. Other possibilities include sampling just before or during the next run. Choice depends largely on the nature of the trouble. If samples are made, a complete record of how they are made and results is kept in the log. Any changes that result are, of course, incorporated into the card.

Core record cards

Core Job Record Cards (Fig.4) are completed by the recorder in much the same way as the cards used for molding and other operations. Information is obtained from observation of cores in process and on the advice of the foreman, along with basic data from the log.

These cards are kept filed in the core room office and are used by the foreman as the basis for instructing operators when a core job is started. Otherwise, the same procedures are followed. Supplementary records pertaining to cores are kept in the same job record logs.

▶ *A.F.S. presents safety training courses*

■ Under the auspices of the A.F.S. Safety & Hygiene & Air Pollution Program, the Society will conduct a series of five 2-day safety training courses during 1952-53. The courses are planned primarily to meet the needs of smaller foundries. The aim is to instruct supervisory personnel on how to set up and maintain a plant program so as to improve safety and hygiene and air pollution practices.

The first three courses in October, November and January will be available to plants in the Chicago area only. If demand is sufficient, the February and March courses may be broadened in scope. The entire series, under the supervision of W. N. Davis, director of the A.F.S. program, will be held at the Sherman Hotel, Chicago, on the following dates: October 9-10, November 6-7, January 15-16, February 19-20, and March 26-27.

Each course will occupy two full days, including luncheon both days and a dinner addressed by a prominent speaker. Experienced foundry safety directors will be featured on the program, which will include specialized films, charts and data. In order to develop maximum discussion, each course will be limited to enrollment of 30, reservations accepted on a "first-come first-served" basis.

Subjects to be covered by these training courses on "Fundamentals of Foundry Safety" are as follows:

"Fundamentals of Foundry Safety (Organizing a Safety Program)," W. N. Davis.

"The Foreman—The Key Man," T. A. Kraklow, Deere & Co., Moline, Ill.

"Foremen's Safety Conferences," W. N. Davis.

"Building Safety Into the Plant," John W. Young, International Harvester Co., Chicago.

"Plant Inspections," Walter Hanau, Fidelity & Casualty Co. of New York, Chicago.

"Building Safety Into the Working Force," Glen Griffin, National Safety Council, Chicago.

"Maintaining Interest in Safety," J. D. Holtzapple, Continental Foundry & Machine Co., East Chicago, Ind.

"Machine Guarding," Leonard Cole, Crane Co., Chicago.

"Electrical Hazards," M. F. Biancardi, Allis-Chalmers Mfg. Co., Milwaukee.

"Materials Handling," W. N. Davis.

"Personal Protective Equipment," Floyd Van Atta, National Safety Council, Chicago.

"Accident Records and Analysis," George B. Milligan, Minneapolis-Moline Co., Minneapolis.

"Fire Prevention," Harvey W. Johnsen, Ford Motor Co., Chicago.

"Industrial Health Hazards and Control," by Warren Cook, Zurich Insurance Co., Chicago.

Courses will be operated at cost, with registration fees of $20.00 for A.F.S. members S & H & AP program contributors, $35.00 for others, payable in advance and including sessions, group meals, and materials. All reservations should be made promptly with W. N. Davis, American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, (Phone: HArrison 7-8320).

▶ *Urge return of Transactions order form before September 30*

■ September 30 is the deadline for return of prepublication order forms for the 1952 issue of A.F.S. TRANSACTIONS, Vol. 60. Order forms were sent to all members early in August to enable them to take advantage of the low prepublication price of $6.00. Following September 30, price to members will be $8.00. Non-member price is $15.00.

Sustaining and honorary members of A.F.S. receive TRANSACTIONS gratis *on request.*

▶ *NBS experimental foundry develops versatile core boxes*

■ At the National Bureau of Standards a simplified system of cylindrical core boxes has been devised by Richard H. Harwell and J. H. Schaum. A set of 14 boxes for cores ranging in diameter from ⅜ to 2 in. in ⅛ in. steps has been made. There is one box for each diameter core, the length of each fixed at the maximum needed. Shorter cores can be cut from full-length units, or can be made by placing cylindrical pieces of wood of the proper length in the core-box cavity. Though the boxes at NBS experimental foundry were made of wood, metal might prove more satisfactory in production work. When a core with a tapered end is required, a brass insert having a standardized taper is placed in the core box.

Small foundry, small castings

■ Small, precise castings can be a headache to large foundries, geared for size and volume. The similarity of the small castings to chills often causes their segregation into remelt. Large cutting torches, removing them from their gates, can ruin them. They often get shipped out in core pockets of large castings, or buried under a load of scrap the crane operator has dumped into an "empty" tote box. Large foundries often find themselves making 400 small castings to get a desired 200!

Goltra Foundries Inc. of Barrington, Ill., specializes in these "nuisance jobs", working in cooperation rather than competition with the many larger foundries which recommend them for this type of comparatively delicate work. Goltra is probably the smallest, least orthodox, and most highly mechanized steel foundry in the country, employing 14 men in a floor area 40 by 80 feet. Offering four types of steel—.20-.30 Carbon, .40-.50 Carbon, Manganese-Vanadium, and Chrome-Vanadium—they can handle sections to ⅛ in. and tolerances to ±1/64 in. Castings range from one ounce to five pounds.

Felt it was needed

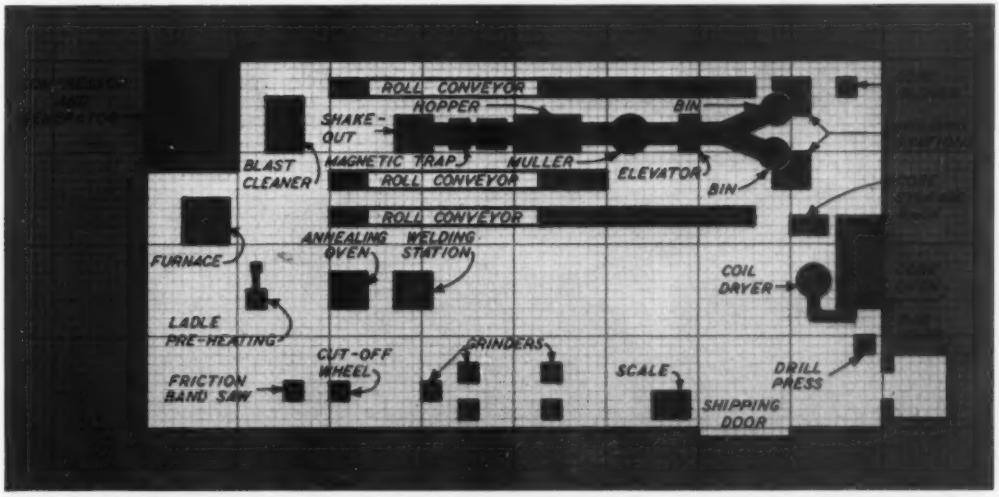
President William B. Goltra ended a 17-year association with American Steel Foundries in 1946 to start his own business. His experience in both operations and sales at American Steel's Indiana Harbor (Ind.) Plant had convinced him of the value of such a foundry to the metal castings industry.

The plant itself is built of concrete blocks, and was deliberately made in such a way that it could be converted into a warehouse in case the expected orders did not materialize. Capacity runs around 3000 castings per day, principally sold on a piece (rather than weight) basis.

Melting is done in a 300-lb electric induction furnace, powered by a 160-hp motor generator set. Pouring is from an 80-lb teapot spout ladle. Although the use of such a ladle is not standard practice in steel foundries, it was successfully adopted from gray iron practice. In fact, many such practices are used, such as pouring two-up (two sprues and two runners) in a mold.

An air hoist is used for tapping the furnace, as this is felt to give better control than an electric hoist. Better control is the main reason that a larger ladle is not used for pouring, although a technique for using their bull ladle is under study.

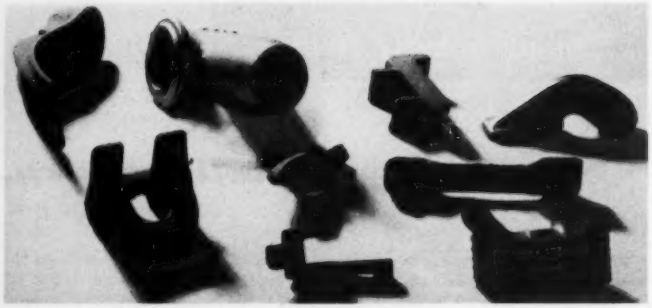
Patterns are ordered from outside sources. Gates and heads are con-



Goltra's good layout permits full-scale operations in a limited floor space. Definite areas enclose related jobs, overlapping only where functions overlap. Sand treating system is the heart of the layout; at one end are the molding stations, overlapped by the core-making area; at the other end is the melting area, conveniently close to finished molds which come along the gravity roll conveyors on both sides of the sand system. Castings from shakeout cut directly across to the cleaning stations along the other wall. Result is clear, uncluttered working areas with a sensible flow of materials and castings, no confusion or interference, and considerably reduced chances of accidents on the floor.

Goltra has always preheated its ladles to prevent temperature loss between tapping the furnace and actual pouring operation. There is not enough slag in the induction furnace to coat the sample spoon, so company makes its own ceramic spoon from ladle mix, preheats it with waste heat that comes out of the teapot spout of the ladle.

Welding station for repairing surface defects of castings stands in the center of the floor by the heat treating oven.



Typical Goltra castings are small, precise. Castings at center front is 2½ in. long. Castings are so small trademark is "— — ·", international code for G.

sidered a necessary part of the pattern and are included in the pattern quotation. They are left on if the pattern is later sent to another foundry. Goltra always requests customer permission to make a complete layout for the pattern maker to follow.

Heat treating and final blasting are also farmed out. Their electric heat treating furnace is used only for small rush or emergency jobs. Melting scrap is obtained from various sources, but consists principally of punchings from various perforating companies.

Furnace repairs

As there is no repair shop for the electric furnace in the Barrington area, Goltra built their own oven for baking insulation on the ½-in. water-cooled copper tube that forms the heating coil. The dielectric insulation must be baked for three hours at 350 F, and the recirculating heat from their gas-fired core oven proved ideal for this purpose. Oven is also used for drying the large ladles.

Sand system forms a closed cycle. At the shake-out a dense spray of water, treated with a wetting agent, envelopes the entire mold area. The primary purpose is to reduce dust; secondary purpose is to wet and cool the hot molding sand to aid in breaking up core and sand lumps. The pan under the shakeout table acts as a feeder and deposits the returning sand on an elevator feed belt. As the sand progresses it passes under a magnetic cross belt and falls onto a breaker screen.

Under this screen there are six fan-tail sprays of "wet" water covering the entire area. This is the principal point of removing heat from the sand. It falls through this water veil and into a hopper at the bottom of which is a mechanical feeder supplying the batch muller. A measured amount of cereal and bentonite is added here to maintain

Sand is mechanically conditioned in 200-lb batches by muller located between the cooling bin and the overhead aerating unit. A measured amount of cereal and bentonite is added in the muller to maintain strength of the sand.

Foreman Edward Bills (left) consulting founder of organization W. B. Goltra.

Vents carry grinding dust from the cleaning stations out to a dust tube collector standing outside main building. Full safety measures are always observed.

sand strength. Permeability has not been a problem, undoubtedly due to the small amount of metal poured in each mold. Moisture is tested in a dryer containing a built-in scale and providing a direct reading in moisture content. Infrared light and a blower provide the drying medium.

After a conventional mixing period, the mull is discharged onto another elevator belt. The elevator discharges onto an aerator which in turn drops the sand into twin hoppers which feed the two molding stations.

Cleanliness of the plant is outstanding. Melting is done at one end of the building, beneath an exhaust fan. Shakeout is by a long row of windows and under a second exhaust fan. Floor fans provide local ventilation wherever needed. Cleaning operations are vented, with ceiling ducts carrying the forced draft to a bag house standing outside the main building of this small but modern steel foundry.

Over-all view of the sand treating system shows its simplicity of design, with molding stations at far end, pouring and shakeout at near end. Nozzle over shakeout table deposits a spray of "wet" water over the castings to reduce dust. The roll conveyor along left side holds molds ready to be poured.

Unit at center right is a cross-belt magnetic separator for removing bits of tramp steel from the used sand.

Core maker (left background) bakes cores in recirculating, gas-fired oven, stores them on rack (center). Tank-like device in foreground is the coil dryer Goltra built for furnace lining repairs. It uses waste heat from the core oven.

Effects of graphite and bonding agent

Foundry crucible service life

R. A. HEINDL / *Chief, Refractories Section, National Bureau of Standards, U. S. Department of Commerce, Washington, D. C.*

Which is the best type of flake graphite to use in crucibles? Is clay a better bonding agent than such organic materials as tar and pitch? Are large graphite flakes superior to small flakes in crucible mixes? Tests run by the National Bureau of Standards in cooperation with six selected brass foundries give the answers to these basic questions.

■ Graphite crucibles used in the non-ferrous foundry are manufactured in two general types. The one contains clay as the bonding agent and consequently is generally referred to as the clay-graphite crucible. The second contains an organic binder, such as tar or pitch, and is referred to as the carbon-bonded type. Both types contain silicon carbide as well as graphite, though the relative proportions may differ widely. The carbon-bonded type is frequently incorrectly referred to as a silicon-carbide crucible, giving the impression that there is no graphite in its composition.

In the United States, flake graphite imported from Madagascar is used almost to the exclusion of other graphites in both types of crucibles. Information is lacking as to whether flake graphites from other sources are equally satisfactory for the purpose. Because graphite is considered a strategic material and is a stockpile item, the Munitions Board suggested to the National Bureau of Standards that an investigation be undertaken leading toward the development of a Federal Specification for this commodity.

The investigation undertaken was to evaluate the relative merit of three series of crucibles manufactured respectively from Alabama, Pennsylvania and Madagascar graphite. This was accomplished by placing the crucibles in non-ferrous foundries and determining the service life of each in regular melting practice by recording the number of heats obtained.

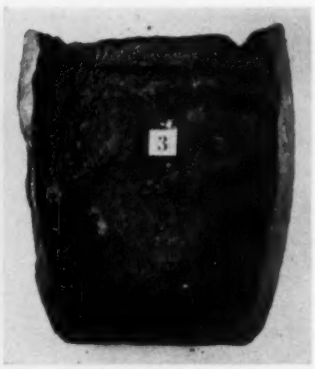


Fig. 1 . . . Crucible 3, size 80, carbon-bonded Pennsylvania graphite tested in a gas-fired furnace yielded most heats, 186. Walls and bottom were uniformly except for spalled section at left.

Fig. 2 . . . Crucible 11, size 50, clay-bonded Alabama graphite tested in a coke-heated furnace, gave 46 heats before springing a leak. Walls were notably thin at the shank line.

The graphite mined in Alabama was obtained through the Federal Supply Service, General Services Administration of the United States Government. It represented a lot from a shipment to the Federal Government stockpile. The Pennsylvania graphite from the Ben Franklin mine near Chester Springs, Pa., was supplied by the U. S. Bureau of Mines. The Madagascar graphite was purchased directly from one of the importers.

Manufacture of crucibles

Arrangements were made with the American Refractories & Crucible Co., North Haven, Conn., and the National Crucible Co., Philadelphia, to manufacture the crucibles. The former agreed to produce the clay-bonded type of crucible and the latter the carbon-bonded type. The formulas used by these companies for regular production of crucibles supplied to the brass melting foundries were not altered in any manner. National Bureau of Standards supplied the graphite after screening and recombining the flake sizes to the percentages specified. Each of the three graphites was designated only by a key letter to prevent identification of the source of the graphite by individuals other than those at NBS.

The selection of these particular manufacturers made it possible not only to have crucibles prepared with different bonding materials but also to use graphite of considerable difference in flake sizes. The clay-bonded type of crucible contained mostly large flakes. The carbon-bonded type contained mostly fine flake sizes; there is considerable resistance to the exclusive use of

graded small flake graphite in crucible mixes by many manufacturers, both in the United States and Europe. The flake sizes applied to all three of the graphites used in the investigation.

An NBS representative was present at each of the plants during the weighing and tempering of the ingredients, and the jiggering of the plastic mass. Each crucible was permanently identified by number and also by a secret mark to guard against mixup. The finished crucibles were inspected for defects and then shipped to brass melting foundries for tests of service life. One crucible of each size and type and of each

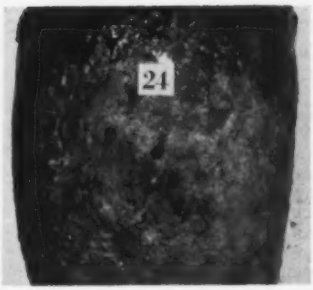


Fig. 4 and 4a . . . Crucible 24, size 150, clay-bonded Alabama graphite tested in an oil-fired furance, leaked after 36 heats. Exterior (left) shows bad spalling. Thinness of upper third of interior wall is accentuated at flux line.

Fig. 3 . . . Crucible 18, size 80, carbon-bonded Alabama graphite tested in an oil-fired furnace, leaked in the side wall after 85 heats. Failure was due to corrosion at flux line, spalling.

Fig. 5 and 5a . . . Crucible 23, size 90, carbon-bonded Pennsylvania graphite tested in an oil-fired furnace, leaked after 36 heats. Walls indicate little wear in comparison to bottom. Service life of same crucibles was significantly shortened due to the bottom sticking to the pedestal during heating, causing slow disintegration and opening of laminations which leaked metal.

of the three graphites was delivered to the National Bureau of Standards for physical tests.

The foundries were selected before the crucibles were manufactured in order that the sizes to which each was accustomed would be delivered for test. The selection of foundries was limited to those melting brass and where enough furnaces were in operation to insure a rapid rate of progress in the determination of the service life of the crucibles.

The six chosen to make the tests used crucibles ranging in sizes from No. 50 to No. 150. Melting capacity of crucibles of these sizes ranges from approximately 180 to 470 pounds of brass, respectively. The fuels for heating the furnaces included coke, gas, and oil. Every effort was made not to upset the routine melting practice of any of the foundries.

The carbon-bonded and the clay-bonded crucibles were delivered to

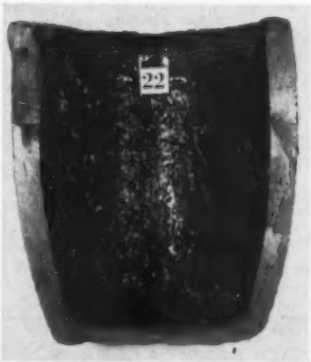


Fig. 6 . . . Crucible 22, size 90, carbon-bonded Madagascar graphite tested in an oil-fired furnace, leaked in the bottom after 40 heats. Bottom is thin compared to walls. Failure was due to mechanical disintegration of bottom.

Fig. 7 . . . Crucible 29, size 90, carbon-bonded Pennsylvania graphite tested in an oil-fired furnace, gave 157 heats before leaking at bottom. In contrast with crucible 23 tested in same foundry, wear was uniform throughout.

TABLE 1—STRENGTH AND YOUNG'S MODULUS OF GRAPHITE CRUCIBLES

Crucible Size Number[1]	Source of Graphite	Type of Bond	Modulus Rupture, psi[2]	Variation Coefficient, per cent[3]	Young's Modulus of Elasticity, psi x 1000[2]	Variation Coefficient, per cent[3]	Max. Outer Fiber Strain, per cent[4]
50	Ala.	clay	2,035	3.9	3,470	4.1	.06
150	"	"	1,395	8.9	3,340	0.3	.04
80	"	carbon	730	10.2	1,045	3.3	.07
90	"	"	810	24.1	1,135	6.6	.07
50	Penn.	clay	1,675	10.2	3,345	4.4	.05
150	"	"	1,660	5.2	3,120	1.5	.05
80[5]	"	carbon	750	1.5	945	1.1	.08
90	"	"	860	18.5	1,200	10.2	.07
50	Mad.	clay	1,590	11.0	3,050	1.1	.05
150	"	"	1,415	1.5	2,740	5.9	.05
80	"	carbon	555	8.4	855	4.1	.06
90	"	"	735	3.3	1,185	5.0	.06

1. One crucible of each size and type included. All crucibles glazed except those numbered 80. Glaze removed by grinding before specimens cut from crucibles were tested
2. Average for three specimens
3. Recommended methods for interpretation of refractory test data, Manual of ASTM Standards on Refractory Materials, Nov. 1937
4. Modulus of rupture divided by modulus of elasticity, multiplied by 100
5. Average of two specimens only

TABLE 2—RESULTS OF SERVICE TESTS OF GRAPHITE CRUCIBLES

FOUNDRY[1]	1	2	3	4	5	6[4]
CRUCIBLE						
Total tested[2]	18	18	9	9	9	9
Size number	50	90	150	80	80	150
Bond type	clay	carbon	clay	carbon	carbon	clay
FURNACE FUEL	coke	oil	oil	oil	gas	oil
ALABAMA						
Number of heats[3,4]	43(35-47)	61(26-98)	31(29-33)	79(74-85)	123(100-154)	46(42-48)
Pouring temp, F[3]	2228	2172	2204	2302	2168	2090
Melting time, min.[3]	115	59	107	86	51	109
PENNSYLVANIA						
Number of heats[3,4]	36(29-43)	104(36-157)	29(27-31)	76(71-84)	147(124-186)	45(39-50)
Pouring temp, F[3]	2233	2163	2204	2320	2184	2032
M lting time, min.[3]	117	59	106	92	50	110
MADAGASCAR						
Number of heats[3,4]	40(37-41)	51(30-113)	34(18-48)	58(56-61)	144(82-176)	41(34-48)
Pouring temp, F[3]	2232	2182	2107	2300	2167	2079
Melting time, min.[3]	119	59	96	85	53	108

1. Foundries 1, 2, and 4 did not change type of metal throughout test
2. An equal number of crucibles for each type of graphite, except for foundry 6 where results were available on only two crucibles of Madagascar graphite
3. Average of all crucibles
4. The parenthetical figures are the minimum and maximum number of heats
5. Crucibles were tested in a tilting furnace

TABLE 3—AVERAGE HEATS FOR EACH GROUP OF CRUCIBLES ACCORDING TO SOURCE OF GRAPHITE AND BOND

	Alabama	Pennsylvania	Madagascar
Clay bond	40.6	36.7	37.6
Carbon bond	81.3	107.7	76.0

the foundries accustomed to using the respective types as routine practice. Three received only the carbon-bonded type and the other three only the clay-bonded. Records of each heat and other pertinent information were noted on log sheets supplied.

Laboratory tests

The only laboratory tests made were the determination of modulus of rupture and Young's modulus of elasticity. The crucibles retained for these tests were cut lengthwise into quarters. Specimens then were cut from the quarters, again in a lengthwise direction at approximately right angles to the bottom of the crucible. The length of the specimens was 9 inches, the width about one inch, and the thickness from about one-half inch to an inch, depending somewhat on the number or size of the crucible.

For example, after the glaze was ground off, the thickness of the specimens cut from the size 50 crucibles was about one-half inch whereas that from the size 90 was slightly under one inch. One end of each specimen was originally near the rim of the crucible and specimens selected for testing were from different quarters of the crucible.

The specimens were tested in flexure over an 8-inch span with the loading direction perpendicular to the surface that originally was either the inside or outside wall of the crucible. Because the flat face of the flakes is generally parallel to the walls of the crucible it can be assumed that the applied load also was perpendicular to the flakes.

Physical properties

Table 1 gives the average values for modulus of rupture and Young's modulus of elasticity for the specimens cut from the crucibles. Even though only one crucible was tested in each case, the results definitely indicate that the modulus of rupture and modulus of elasticity are appreciably greater for the clay-bonded than for the carbon-bonded crucibles. The maximum outer fiber strain or extensibility (obtained by dividing the modulus of rupture by the modulus of elasticity) is, however, significantly lower on the average for the clay-bonded crucible.

This type of crucible might therefore be expected to have a lower resistance to thermal shock. Also, in spite of the fact that all visible glaze had been removed from the speci-

mens cut from the size 90 crucibles, apparently some residual effect was present. This is indicated by the fact that the strength was slightly greater than noted in the specimens taken from the size 80 unglazed crucibles.

Foundry tests

A summary of the results furnished by the foundries is given in Tables 2 and 3. Appearance of a selected number of crucibles after their usefulness in the foundry had ended is shown in Fig. 1 to 7. The results obtained by the different foundries are not directly comparable because of differences in length of time of melting, the temperature used in the melting operations, and the quantity of metal per heat in relation to the volume of the crucible.

The average number of heats obtained in any one foundry with crucibles of Madagascar graphite was considered as a standard for that foundry. The results of tests in that same foundry with crucibles containing either the Alabama or Pennsylvania graphite were compared with that standard. On this basis the Alabama graphite and the Pennsylvania graphite crucibles indicate greater life in four of six reporting foundries.

Furthermore, if conclusions are based on an overall average, the results (Tables 2 and 3) indicate life of the crucibles manufactured with either Alabama or Pennsylvania graphite to be at least as good as, if not slightly better than, that of the Madagascar graphite crucibles.

Temperature of melting is known to have an effect on crucible life, as is also the type of fuel. For example, in foundry No. 3 the Madagascar graphite crucibles were subjected to an average temperature about 100 F lower than the crucibles made from either the Alabama or the Pennsylvania graphite. Foundry No. 5 used gas, and its melting temperature was about 135 F below that of foundry No. 4. The type of fuel and lower temperature of operation probably accounted at least partially for the substantially greater number of heats in foundry No.5 when compared with foundry No. 4, since the same size and type of crucibles were used by both.

In drawing conclusions, consideration should be given if possible to mechanical manipulation of the crucibles in the foundries. This is especially true because in some foundries only three crucibles of each graphite were tested. For example, if a hole was accidentally punched in one of the three crucibles during cleaning, or if one foundry found it necessary to clean its crucibles frequently, the average life for the affected group would be lowered. Although desirable, it was not practicable to consider such factors in this particular investigation.

Foundry No. 2 indicated failure of its test crucibles because of metal leaking through the bottom. The walls of almost all the crucibles at this foundry were only slightly corroded (Fig. 5 and 5a), denoting that many more heats might have been made. The bottoms, however, had been slightly separated in layer-like fashion to permit leakage of metal. This condition was apparently due to the adherence of the bottom of the crucible to the block on which it rested in the furnace. The wide range in number of heats indicated for this foundry in Table 2 may be caused by such circumstances. No attempt has been made to explain why the Pennsylvania graphite crucibles, which had been subjected to the same condition, averaged so many more heats than did those of Madagascar graphite.

Conclusions

The information given in Table 2 permits four main conclusions, made with the realization that testing a greater number of crucibles might cause some slight rearrangement in the order of performance as indicated by the average heats for any one foundry. It is believed, however, that significant change would not result in the overall average number of heats obtained by all foundries.

1. The number of heats obtained in non-ferrous foundries with crucibles manufactured of Madagascar graphite is no greater than that obtained with crucibles manufactured with either Alabama or Pennsylvania graphites.

2. The average number of heats obtained with carbon-bonded crucibles is approximately twice as great as for those in which clay was used for bonding.

3. Graphite flake used in the carbon-bonded crucibles was smaller in size than that traditionally used by some manufacturers of this type of crucible. However, the number of heats obtained indicated that the absence of large flake in the crucible mixes did not detrimentally affect the life of the crucible. This conclusion is based on a comparison of the results obtained in this investigation with records available in the foundries of the number of heats obtained from crucibles containing large flake graphite used in the same foundries for the past several years.

4. Graphite from the two domestic sources covered by this investigation may be stockpiled with confidence that quality crucibles can be manufactured therefrom. This conclusion is based on the proviso that the graphite offered for stockpiling is of a quality equal to that used in this investigation.

Acknowledgment is due the following companies for their cooperation with the testing of the crucibles: Ampco Metal, Inc., Milwaukee; Chicago Faucet Co., Chicago; Chicago Hardware Foundry Co., North Chicago, Ill.; General Electric Co., Philadelphia; Johnson Bronze Co., New Castle, Pa.; and Sloan Valve Co., also of Chicago.

▶ *"Foundry Work" included in list of year's best technical books*

■ "Foundry Work," the textbook written by Edwin W. Doe in cooperation with the Educational Division of A. F. S., was honored recently by its inclusion in the ninth annual *Library Journal* listing of 100 leading technical books. The selection was made by R. R. Hawkins, chief of the Science & Technology Div. of the New York Public Library.

Mr. Doe's volume was described as a "very well written and adequately illustrated book at the high school and trade school level." It was also noted as "suitable for beginning students and readers whose acquaintance with or interest in the subject is mainly practical."

Publisher John Wiley & Sons report that favorable reviews are coming in. *American Machinist* termed it "of real value as a source of information on the fundamentals of foundry practice"; *Machine & Tool Blue Book* called it "valuable."

The book is also achieving an international reputation. *Foundry Trade Journal* (England) stated: "It is written in plain straightforward language, is profusely illustrated with photographs, diagrams and sketches, and the subject matter is carefully arranged so that continuity and interest is maintained throughout." The Australian *Commonwealth Engineer* said: "This book fills a gap in the literature on elementary foundry practice."

Author Doe is currently in Brazil as a foundry specialist with the Educational Div. of the Institute of Inter-American Affairs.

How good layout improves operations

The non-ferrous cleaning room

MARTIN G. DIETL / *Foundry Production Engineer, Schaible Co., Cincinnati*

This paper was presented at the Wisconsin Regional Foundry Conference in Milwaukee, February 7 and 8, 1952. It describes in detail the equipment generally used in non-ferrous cleaning rooms, elaborating on proper use, advantages, and disadvantages of each. Included is a description of the layout used in the author's plant to process more castings in less time, with processing at a maximum and wasteful handling at a minimum.

■ Even though the profit or loss of an entire operation is often determined in the cleaning room, that department is most often neglected in any program of foundry improvement. More often than not, a modern, mechanized foundry funnels its castings into an outmoded and inefficient cleaning room. The bottle-neck thus created has to serve the dual purpose of cleaning the castings and of remedying the foundry's mistakes in order to create a salable product. Great emphasis is placed on the rigging of a given pattern to produce a good casting; too little attention is paid to the profit lost when a gate is cut and ground off.

The work of the cleaning room begins when the pattern is fitted for its gate and runner, and is continued by good core room practices and subsequent foundry techniques of close sand control and good metallurgy. No one will deny that the first function of the rigging of a pattern is to produce good castings. The second and third obligations are to produce those castings economically and with the least amount of processing time. A pattern that is rigged so badly that its gates cannot be cut readily with a knife, band saw, or friction wheel is wasteful of man-hours. The excessive finning caused by either badly fitting core prints or faulty pasted cores reduces cleaning room efficiencies, as does an inaccurately formulated core mixture.

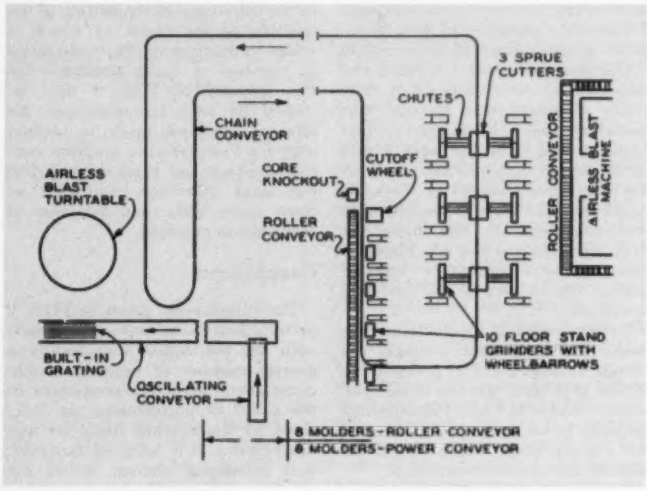


Diagram shows the cleaning room layout at the author's plant. It was designed to meet specific requirements of the foundry, as every layout should be.

It is axiomatic that a good core has many properties ordained to define the inside of a casting. However, the work of the core is accomplished once the metal has solidified. The core sand mixture can be so formulated that a given percentage of core sand enters the system molding sand to maintain the desired permeability; otherwise the core becomes a liability of the cleaning room. Good core collapsibility upon metal solidification stems from accurate core mixture control. Similarly, the cleaning room can be further assisted in grinding castings cheaply by close molding sand control and standardized mold practices. A condition of metal penetration will result either through soft ramming of the mold or poor flowability of too course a sand having too high a permeability. Whatever the case may be, it becomes the duty of the cleaning room to attempt to salvage such castings through excessive chipping and grinding operations.

In the interest of making the foundry a better place to work, no foundry can afford not to mechanize in order to bring forth the best working conditions for labor and the most economical budget for management. In the writer's opinion it is the handling and rehandling of material that wastes man-hours and slows production.

Possibly the first type of mechanization used in transporting castings from the foundry to the cleaning room was the wheelbarrow. Its versatility and handiness still makes it

an indispensable tool. In any number of small unmechanized shops employing 25 people or less, castings are pulled out of the mold and transported by wheelbarrow to some kind of a core shakeout. This device often is nothing more than an allotted space on the floor where a worker using an air hammer and chisel knocks the core and any adhering molding sand from the casting. The wheelbarrow is used again to move the castings to the next operation.

The writer certainly does not wish to leave the impression that the wheelbarrow is a tool of the small shop only; even the largest foundries need the full time use of several. However, since large shops need to transport larger quantities of castings faster, other methods were devised. A skid or tote box enables one man to move much greater loads faster with a power truck. But this method of moving materials does not speed the handling at each work station. For this, it would seem advisable to sort different castings to different skids as soon as the molds are dumped; otherwise it becomes the obligation of the cleaning room to segregate the different orders. Also, sorting gates of castings is more labor saving than sorting castings individually after the sprue cutting operation.

Whenever the foundry is located on the floor above the cleaning room, great quantities of material can be handled by a chute. This method unfortunately has the inherent disadvantage of requiring adequate labor to sort the different castings whenever a number of diverse jobs are so transported. Any type of mechanical transportation of gated castings cannot be considered in the light of faster handling alone. A great deal of thought must be given to the type of castings and quantity to be transported, the work to be done, and the adaptability of any system to the rest of the cleaning room installation.

Types of conveyors

Many varieties of belt conveyors will move castings. The foundryman himself must decide whether initial installation, operating, and maintenance costs will be offset by subsequent savings. As a rule, any equipment that can be installed at floor level in preference to digging a pit is more economical. The popular belt conveyor consists of a duck or asbestos structure impregnated with some rubber formula. In use the belt is supported by frictionless rollers or a reinforcing sheet steel to suit the service. The end or terminal pulleys, either cast or fabricated, are connected to a motor through a suitable gear reducer.

A variation from the belt conveyor is the apron conveyor. In this unit, steel plates from four to six inches wide are interlocked and overlapped to present a continuous surface with enough flexibility to return over a pulley. Underneath, the plates are fastened to a chain which in turn is attached to a flanged wheel. The whole unit runs on a track. Power is applied to a terminal pulley through a sprocket of predetermined size. Again, an electric motor and gear reducer is used to supply power to the sprocket.

The oscillating conveyor applies a different principle to transport material. The conveyor itself consists of a steel trough supported on leaf springs anchored in rubber bushed joints. An electric motor driving a crankshaft through an eccentric imparts an oscillating motion to the conveyor. All of these three conveyors will receive and transport the hot sand and castings from the mold shakeout. In the case of the belt and apron conveyors, the material must be fed over a vibrating screen in order to separate the sand from the castings; with the use of the oscillating conveyor, the trough itself can be slotted to allow the sand to fall away from the casting. In the design and layout of these conveyors, it is imperative that two conveyors changing direction be as close as possible to each other to minimize the distance the hot castings will drop. Without this precaution, long and narrow castings will be bent easily.

For handling such units as boxes or pallets of castings, the roller conveyor is easy and economical to install. Such a conveyor consists of sheet metal tubing mounted by means of dust-proof and frictionless bearings on stationary shafts. The shafts are supported in channel irons, and are spaced to suit individual conditions. As a rule this type of conveyor is either manually operated or moved by gravity. However, power can be applied by means of a transmission belt on the underside of the rollers.

Least expensive

Perhaps the most inexpensive assembly is the chain conveyor. The unit consists primarily of a chain to which two-wheel or four-wheel trunnions are fastened. The I-beams or monorails serving as a track can be assembled in horizontal or vertical curves. The load is attached to the trunnion by means of a hook, while a caterpillar drive pulls the chain along its predetermined path. Since the brass castings are still attached to the runners while being transported from the foundry to the cleaning room, it is convenient to

Mold is shaken out onto oscillating conveyor below floor level. Shaken-out castings and hot sand are now on their way to the airless blast turntable.

move such items by this overhead method.

Once the heterogeneous multitude of castings has arrived in the cleaning room, the laborious and time-consuming job of proper segregation takes place. Such sorting of items must be accurately controlled to preserve customer's order identification, differences in metal formulas, and item identity. Again, in the case of the wheelbarrow operation, small quantities of easily recognized castings are readily sorted and kept segregated as the job passes from one work station to the next. This same procedure becomes highly complex in a large shop. Instead of the wheelbarrow, skids or boxes are required to transport many different castings. Since it is not always feasible to separate each job as soon as the mold is dumped out, large batches of castings reach the cleaning room floor. Separation of items under such conditions is accomplished while the castings are still on the gate. Thus a sorter handles gates of castings instead of each casting individually. The result of such sorting practically reduces the whole cleaning room function to a series of batch operations which require excessive man-hours in addition to many containers to move and identify the casting lots.

From the sorter the batches of castings go to the core knockout and the sprue cutter. At this point the sprues, properly identified according to formula, are gathered in a box while the castings fall into a suitable container and are moved to the sand blast station. The cleaned castings, again transported in convenient boxes, are ground. Another blast cleaning or acid dip followed by a thorough inspection completes the work of the cleaning room.

One can easily see the tremendous amount of handling of material required just to move the castings from one work station to the next. It represents a highly complex operation in which castings are unnecessarily delayed, perhaps even lost. An immediate saving of man-hours can be accomplished by studying each job carefully to determine whether or not a punch and die operation is feasible to trim the castings off its gate. Under those conditions, the gates of castings are sandblasted prior to the punch press operation. Sprue cutting and most, if not all, of the grinding is thus eliminated.

It seems self evident that a more efficient flow of material through the cleaning room will result if the manual handling of batches of castings is reduced. This point together with the streamlining of operations will help to reduce the man-hours needed to process castings. For instance, since the core knockout operator must handle each gate of casting, why is it not possible for him to sort the different items? Carrying this idea further, it is quite possible to process castings through the cleaning room the same day they are cast.

Grated oscillating conveyor separates hot sand from castings. After castings, still with gates, are cleaned in the airless blast table, a chain conveyor moves them to the cleaning room for core knock-out and other operations.

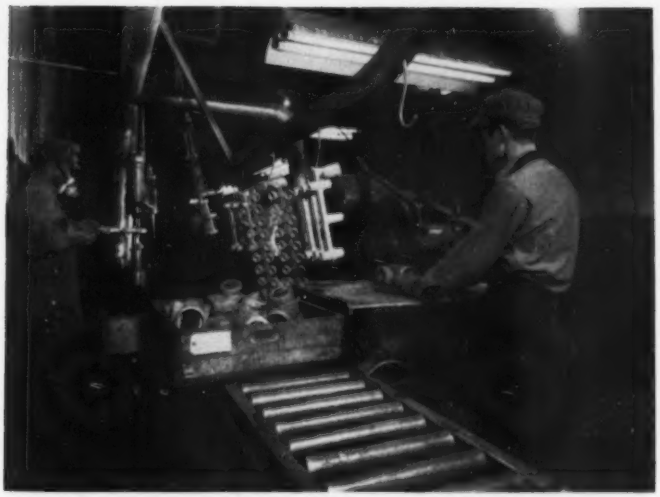
Naturally, such items as Navy orders disrupt the proper sequence of operation in the cleaning room, since these castings must be kept separated by heat numbers until the Navy inspector approves their release. Under these conditions, adequate cleaning room space must be provided to assure proper storage and easy identification of orders requiring test bar approval.

The punch press

In severing the castings from its runner, the punch press advantages have been mentioned as combining the cut-off work element with that of grinding. However, most castings are either too large or too complex to be pushed through a die. For such work the sprue cutter or the band saw is employed. The former consists of an electrically driven flywheel from which energy is transmitted through a cam and an eccentric to a knife edge. The runner is placed on an anvil, also a knife edge, and is cut as the upper knife descends. The band saw provides a range of cutting speeds to meet the size of cut and the composition of the material. In order to meet competitive costs, such factors as saw life, surface finish, tolerances of cut, possible production rates, and tool costs must be carefully weighed. Again, a free flow of gates to the saw and a convenient method of getting the castings away from that work station is a must; otherwise, excessive labor employed in handling the material will nullify any profit.

The saw is about the only machine that will follow the outline of a casting with just one pass. The elimination of the second pass to remove a riser is a cost saving. Cutting speeds for such compositions as silicon bronze, manganese bronze, and aluminum permanent mold castings are low, and are used with a heavy feeding pressure to prolong sharpness of teeth and tool life. But if a smooth finish is important, it is advisable to use a fine saw pitch, high velocity with a light feeding force. The rule of thumb advising higher cutting rates through the use of higher saw velocities has a limiting speed beyond which tool life is impaired. With the new machines having variable speeds from 40 to 15,000 fpm any material can be cut with much greater saw life and efficiency.

With thin, abrasive cut-off wheels, cutting time is a matter of seconds rather than minutes when compared



Castings are picked off the chain conveyor, and all cores are knocked out (left background). Plumbing grades are placed back on the conveyor, while high-pressure castings go to the cutoff wheel (right front) for gate removal.

to conventional sawing methods. Such wheels are made of silicon carbide or aluminum oxide in various thicknesses and diameters for all types of work, and are capable of operating at speeds ranging from 9,000 to 16,000 sfpm depending upon the material in question and the quality of the machine being used. As a rule the fastest cutting can be obtained by using a coarse, hard wheel; however, this will leave burrs and generate enough heat to discolor the metal. For a good finish, a softer, finer wheel is generally used. When possible it is advisable to use as coarse a grit and as hard a grade as the operating conditions will allow. This will assure maximum wheel life and the best overall efficiency. For brass and bronze work a resin bonded, medium grain size, silicon carbide or alundum wheel having a hard, open structure seems to give best results.

Removing excess metal

After cutting the gate off as near as possible to the casting, the remaining excess metal must be removed. Unlike the precision grinder whose machine and work movements are fixed and whose degree of metal removal can easily be standardized, the snag grinder's efficiency is wholly influenced by the operator's judgment. The floor stand grinder, usually a wheel spindle connected to a power source at its center, has a grinding wheel attached to each overhanging end. The rough grinding wheels may be supplemented by two finish grinding wheels all on the same spindle. The operator thus rough and finish grinds a casting by moving from one wheel to the other. The rough wheel for brass and bronze usually varies from 14 to 35 in. in diameter and can be either vitrified or resinoid bonded. The former has an upper limit of 6500 sfpm; the latter, 9500 sfpm.

Human factor

Since grinding machines are sold as a package unit, the grinding efficiency is wholly dependent upon operator fatigue. This factor in turn depends upon such conditions as casting size, weight, and shape; amount of handling required; work movements necessary; and machine vibration. Since the floor stand grinder requires the operator to take the work to the wheel face and actually employ body contact to exert in-feed pressures, any machine vibration will be transmitted to him. As the grinders come powered for manual operations, the use of excessive work contact pressures through the medium of levers or pressure bars will result in high maintenance cost due to overloaded motor and drives.

The brass cleaning room, having more or less similar compositions in its castings, does not experience unequal wheel wear due to differences in metallurgical formula; such wear instead can be traced to differences in operator's techniques and physical makeup. Should unequal wear in wheel diameters occur, proper adjustments can be made on the multi-speed wheel spindle. In the actual operation the operator himself is capable of dressing his wheel. Whenever a wheel glazes over, the cause is either too hard a wheel, or a too fine-grained abrasive. In dressing such a wheel with the dressing tool, both productive grinding time and abrasive material is lost.

Grinder education

An operator can do his own dressing by changing his method and area of grinding on the wheel; similarly, a wheel can be trued if concentrated grinding has grooved it badly. The proper education and supervision of grinders is essential in reducing overall grinding costs.

In cases where stock removal is light, or where inaccessibility does not allow the operator to remove the excess stock, the portable grinder can be taken to the work. As the name implies, it is a light tool, wholly self contained, and can be operated either by air pressure or electricity. Wheel speeds are the same as those of the floor grinders whose work it supplements. As a rule, a hard wheel having a low metal removal rate and less abrasive cost will have a higher labor cost; a soft wheel will have a higher metal removal rate and abrasive cost, but will be lower in labor cost and overhead. Naturally, greater wheel-to-work pressures will increase metal removal and reduce labor cost, but will increase abrasive costs. Again, the time-consuming factors of excessive handling can be reduced by the use of accessories such as hoists and proper conveying equipment. The greatest economics can be realized where the wheel contact time is the highest percentage of the overall time; that is, no interruptions due to moving the work to and from the grinding operator.

Chipping hammers

The use of other pneumatic tools such as chipping hammers is limited in a brass foundry. Generally, the hammer is utilized to knock out very large work and to remove fins and ingates in preference to grinding off the excess stock. Sometimes this tool acts as a corrective measure in

removing areas of heavy metal penetration which are sometimes encountered on castings.

Air blasters

The selection of proper blast cleaning equipment is governed by initial cost, operating cost, maintenance, necessity for auxiliary equipment or special excavations, and desired finish. Still used in small foundries is the hexagonal steel tumbler. By perforating the barrel and partially immersing it in water, the tumbler can be run either wet or dry. Neither method produces a surface sufficiently clean for subsequent machining or plating. This equipment has a low initial cost but a high operating cost due to its limited capacity. Whenever sufficient compressed air is available, the sand blast machine does a good job of producing cleaned castings. It comes in several sizes from the small cabinet involving manual manipulations of the casting under a single stream of air and abrasive to the large units which clean several hundred pounds of castings by presenting the surfaces to several streams of abrasive. Coarse sand is the usual abrasive material because it is not hard enough to become imbedded in the relatively soft brass and cause discoloration.

Centrifugal blasters

Another method of cleaning castings employs centrifugal force to throw abrasive against the casting. The tumbling barrel, through its rotation, exposes all sides of the casting to the fanshaped blast of the grit and so produces a very clean surface. This unit does not use such non-metallic grits as sand or silicon carbide because of the excessive wear such abrasives have on the equipment.

The airless blast unit is designed in many variations to handle all types of castings; it can be supplemented with belt conveyors to make the cleaning operation continuous. Again, careless operation of this equipment produces high operating costs due to the loss of abrasive through leakage or carry-out. As mentioned before, non-metallic grits cause excessive wear of the equipment, and premium shot like steel and copper is too expensive. The cleaning room foreman prefers a grit that does not shatter like chilled iron which imbeds itself in the brass, or steel that is so hard that the casting finish is ruined. He wants a grit that is malleable and yet has long life and low equipment wear.

High-pressure castings are then moved to grinders on the gravity roller conveyors. Since grinder must handle castings one at a time, he is in a position to inspect each for defects. Scrap is thus readily removed from the good castings. Spindles of grinders are equipped for both rough and finish grinding, and a cleaned casting is produced with a minimum of wasteful handling time.

In the author's foundry, producing daily upward of 3,000 molds into which between 50,000 and 60,000 lb of red brass are poured, a high degree of mechanization is carried through to the cleaning room so that the castings are poured and processed in the cleaning room the same day. As stated in the beginning of this paper, the cleaning room operation begins in the pattern shop and is followed by exacting controls in the core room, melt room, and molding floor, together with proper job education and good supervision in the cleaning room.

The "works"

After pouring and cooling sufficiently, the molds are taken off either of two power mold conveyors and shaken out onto an oscillating conveyor. Care was exercised in the installation of the several oscillating conveyors to minimize the casting drop so as to prevent distortion of long and slender castings. Sand and casting together are moved automatically to the cleaning station where the gated castings are removed from the conveyor, placed on a revolving table, and cleaned by airless blasting. The use of a malleable shot in this operation prevents the grit from imbedding itself in the metal. The sand falls through the grating of the oscillating conveyor onto a rubber belt, moves over a magnetic pulley and vibrating screen to a storage hopper.

Core knock-out

The single operator of the airless blaster removes the cleaned castings and hooks them on a chain conveyor traveling at 18 in. per minute. While the chain remains in motion, the core knockout operator removes all core sand and separates the Navy work from the high pressure and from the plumbing brass goods. This is readily accomplished by the proper tagging and identification of the work at the shakeout.

Navy work must be kept separated by heat numbers to await test bar approval. These castings are piled according to heat numbers on skids. The high pressure work is placed on a roller conveyor which momentarily acts as a bank of castings for the cut-off machine. The cut-off operator, using a reinforced alundum wheel, cuts the castings off the gates and scoops the product into a tote box on the roller conveyor. The filled box moves along to the floor stand

Meanwhile, the chain conveyor carries the plumbing goods and low-pressure valves to the sprue cutter. Stem separation is automatic, since each cutter takes only the type of castings assigned to him. Complete separation is achieved by funneling only specific types of castings down each of the four chutes. Grinders at the bottom finish the work and put it in a wheelbarrow for moving.

grinders. The grinder, since he must handle each casting separately, is in a position to inspect each casting. Scrap is thus readily removed from the good castings. Also, the spindles of the grinders are equipped with both rough grinding and finish grinding wheels. In this manner a cleaned casting is produced with a minimum of handling labor.

Plumbing goods

The plumbing brass goods and light pressure castings are replaced on the chain conveyor after core knockout and carried to the sprue cutter. This operator trims the casting from the gates, and funnels the castings to one of six grinders through chutes. The assignment of certain castings to each sprue cutter affects a segregation of different items at the floor stand grinder. This automatic separation again reduces handling time. The sprue and gates are dropped onto an oscillating conveyor to be dumped into a furnace charging bucket. Each grinder rough and finish grinds his castings; he sorts and discards the scrap. Good castings are placed in a two-wheel dump truck by the grinder, and are wheeled and dumped into the receiving hopper of a tumbling blaster. Since this is a batch operation, the blast operator wheels the load from the grinder to his machine. After the casting has been subjected to the malleableized grit blast, the casting load is emptied into shipping boxes resting on a roller conveyor. One section of this conveyor is attached to a scale so that the load is automatically weighed and counted.

The layout of the cleaning room gives a continuous flow of castings. Processing time was increased to a maximum at a corresponding reduction in material handling time. By the very nature of this set-up, castings must be processed through the cleaning room the same day they are cast. This accomplishment is further assisted by adequate piece work rates and good working conditions, enabling the worker to make a good wage in good surroundings.

Custom-designed

Other layouts, of course, may work equally well if not better. It is of paramount importance to remember that each cleaning room must be "tailor-made" for its particular requirements. It is equally important to speculate on new molding processes—shell molding, for example—that will undoubtedly influence future cleaning room functions and layout needs.

▶ *Wanted—Used Copies Vol. 58, Transactions of A.F.S.*

■ The A.F.S. National Office is buying used copies of TRANSACTIONS (vol. 58, 1950) to meet the high demand for this edition. Copies in good condition which are not needed by their owners can be sent to American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.

▶ *Donations still coming in for A.F.S. building fund*

■ Member companies and individuals, acting voluntarily and without solicitation, still are sending in contributions for the permanent A.F.S. Headquarters Building. Although general solicitation was abandoned in May, 1951, when the original goal of $100,000 had been oversubscribed to $135,000, the Society will continue to accept additional financial support.

The total fund today exceeds $143,000, of which less than $12,000 consists of pledged sums.

Following an unforeseen delay of six months in selection of a site, it is expected that definite announcement of where the building is to be located will be made prior to October 1. By action of the Board of Directors, the Society is seeking a location in a Chicago suburb where a new building will be designed and constructed, and recently voted to make up from reserve funds any difference between funds contributed and total cost.

Last January a site was approved in Des Plaines, Ill., and petition filed for rezoning for the Society's purposes. This petition, approved by the local zoning appeal board and two meetings of the city council, was defeated on May 5 following protests from nearby residents of the community who want construction in the area restricted to residential units.

The matter was revived and again presented, with a definite negative vote finally issued on July 21. Since then a number of other sites have been studied, in keeping with architectural plans displayed at the Atlantic City Congress.

Latest contributions to the Building Fund have come from the following sources:

Alexander Carmichael, Sydney, Australia.

Lt. H. R. Dahlberg, Skokie, Ill.

R. E. Kennedy, Wilmette, Ill.

J. S. McCormick Co., Pittsburgh (additional contribution).

K. H. Priestley, Vassar, Mich.

Chicago selected for five-day

1953 CONVENTION

■ Annual Convention of the American Foundrymen's Society in 1953 will be held in Chicago. Dates are May 4 through 8. Unlike previous non-exhibit Conventions, next year's will run five instead of four days to accommodate all desired technical sessions and other Convention activities.

The number of papers and sessions scheduled for 1953 will approach the record number of this year's 7-day International Foundry Congress and Show. In addition to the technical papers on every phase of foundry practice and technology, the customary informal, off-the-record round table luncheons and shop courses will be held. Other technical features are an allday symposium on sand reclamation and the Charles Edgar Hoyt Annual Lecture.

Such traditional events as the Annual Banquet, the Canadian Dinner, the Educational Dinner, the Past Presidents' Breakfast, and the A.F.S. Alumni Dinner are concentrated on Tuesday, Wednesday, and Thursday to accommodate the greatest number of Convention attendants. The technical program is built around these events with sessions grouped by metal interest to enable most Convention-goers to take in the maximum number of related meetings in the shortest possible amount of time.

A complete program for the ladies starting with the A.F.S. Tea, at which the Society plays host, will run throughout Convention week.

The tentative program calls for technical meetings on light metals, brass and bronze, and malleable iron to lead off on Monday, May 4. Sessions in these fields continue throughout the day, augmented by a session on education in the afternoon. The first of six technical luncheons will be held Monday noon when the Light Metals Round Table Luncheon is slated. In the evening there will be simultaneous Gray Iron Shop Course and Sand Shop Course sessions. These meetings are customarily held at night to enable local shop men—who may attend without the usual Convention registration—to participate.

Tuesday, May 5, opens with technical papers on light metals, heat transfer, and malleable iron. At noon the Brass and Bronze Round Table Luncheon and the Malleable Round Table Luncheon will be held. Light metals, heat transfer, and education will be discussed at early afternoon sessions, with late afternoon meetings devoted to pattern practice, brass and bronze, and safety & hygiene & air pollution. The Educational Dinner and the Canadian Dinner are set for the evening of May 5 as are the second meetings of the Gray Iron and the Sand Shop Courses.

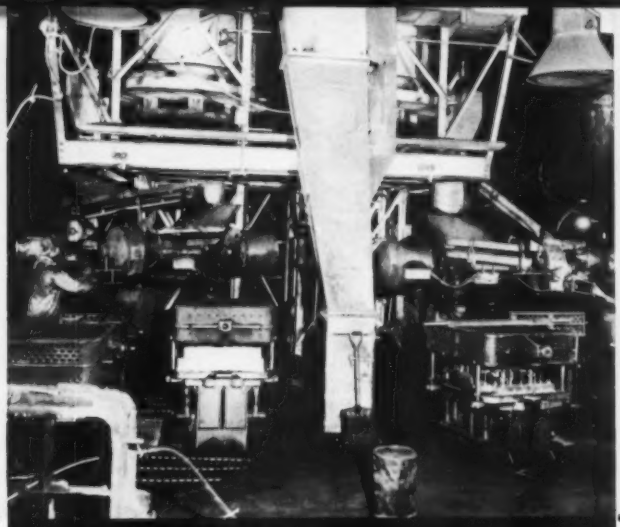
Past presidents of the Society will gather for their traditional Past President's Breakfast the morning of Wednesday, May 6. Most of the day is given over to the Symposium on Sand Reclamation with sessions both morning and early afternoon. At noon is the Pattern Round Table Luncheon. Late afternoon technical meetings will be on refractories, time study and methods, and safety & hygiene & air pollution.

Concluding the day is the Annual Banquet. As at the Annual Business Meeting the following day, President I. R. Wagner, Electric Steel Castings Co., Indianapolis, Ind., will preside at the Annual Banquet. His greeting to Banquet attendants and the presentation of Gold Medals and Honorary Life Memberships are features of the Annual Banquet.

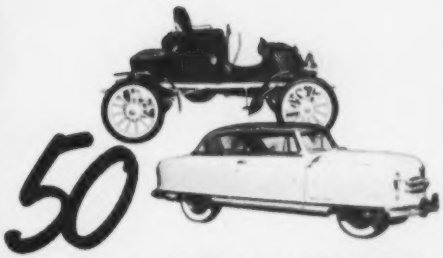
The morning of Thursday, May 7, is devoted to the Annual Business Meeting and the Charles Edgar Hoyt Annual Lecture. Business Meeting highlights include the Presidential Address, election of officers and directors, and presentation of

continued on page 111

Chicago skyline at night looking northwest past Buckingham Memorial Fountain in Grant Park.



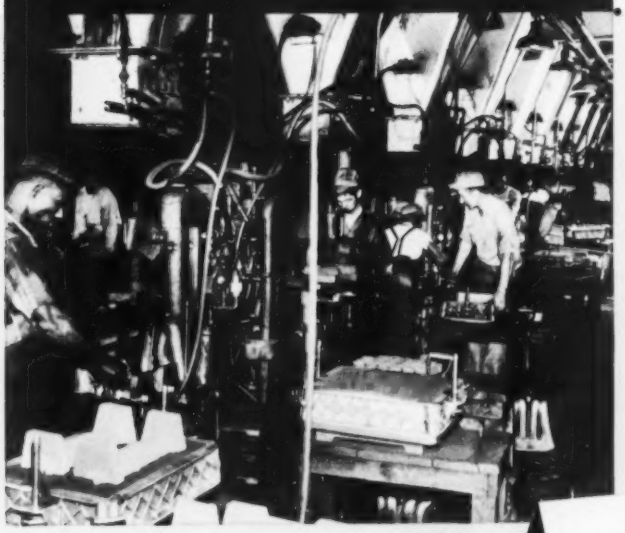
SANDSLINGERS These two slingers, one for copes and one for drags, ram all of Nash's cylinder block molds. Three Champion Speed-Draw Machines are mounted on each B&P Roto-Mold Turntable.



50 YEARS OF PROGRESS AT **NASH**

30 YEARS OF B&P SERVICE TO NASH

CHAMPIONS Nash's newest molding line is equipped with Champion Squeeze and Jolt-Squeeze Molding Machines. A Model "80" Speedmullor with Multrolmatic automatic controls provides sixteen machines with mulled sand.



Recently Kenosha, Wis., celebrated Nash day, marking the fiftieth anniversary of this pioneer auto builder. B&P has served Nash for thirty of those years and today Nash depends on B&P equipment throughout its foundry.

Five out of six Nash production molding lines are built around Sandslingers. The sixth line utilizes Champion squeeze and jolt-squeeze molding machines and is provided with mulled sand by a Model "80" Speedmullor. Nash benefits from B&P equipment and so can you . . . write today —Beardsley & Piper, Div. of Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39, Illinois.

B&P

LOOK TO BEARDSLEY & PIPER FOR BETTER METHODS

MEMBER FEMA

The only completely NEW JOLT SQUEEZE PIN-LIFT!

the J&J 716-8

FOR MEDIUM SIZE PRODUCTION AND SEMI-PRODUCTION WORK

Table Size	24" x 34"
Jolt Cyl. Diam.	7"
Squeeze Cyl. Diam.	16"
Pattern Draw	8"

WANT FLEXIBILITY AND SPEED?
The 716-8 comes equipped with an air-operated swinghead for either left-hand or right-hand operation. A touch of the control lever moves the swing-head into position instantly.

WANT LOW MAINTENANCE?
All working parts are fully enclosed. Hardened and ground internal guides assure retained accuracy of draw with minimum maintenance.

WANT AN ACCURATE DRAW?
Exclusive concentric draw design with a single concentric draw cylinder guided by a full diameter bearing area of the squeeze cylinder assures the smoothest, most accurate draw available with this type machine. There is positive slow and fast draw on the same stroke with automatic vibrator control, and the length of slow draw is automatically controlled.

WANT SIMPLICITY AND EASE OF OPERATION?
Two convenient pilot valves control all operations of the 716-8 including the air-actuated swinghead. An inexperienced worker can become a qualified machine operator after a few cycles of operation.

write today for complete information

JOHNSTON J&J JENNINGS

AN IMPROVED LINE!

- Jolt Rollover Pattern-Draw
- Jolt Stripper or Pin-Lift
- Jolt Squeeze
- Jolt Squeeze Pin-Lift
- Plain Air-Jolt

MOLDING MACHINE DIVISION
THE JOHNSTON & JENNINGS COMPANY
Division of Pettibone Mulliken Corp.
2424 North Cicero Ave., Chicago 39, Illinois

The truth about disease caused by foundry dusts

This paper—by the man credited with having done most to separate fact from fiction in the field of dust-caused diseases in the foundry—was given at the Foundry Health Conference held at Ann Arbor, Mich., on April 11-12, 1952. It and all others presented at that time have been compiled into a 200-page publication, *Health Protection in Foundry Practice*, published by A.F.S.

O. A. SANDER / *Industrial Medical Consultant, Milwaukee, Wis.*

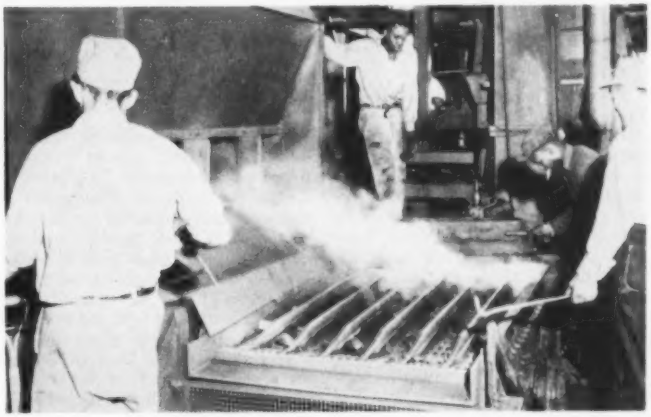
■ Although others may soon replace it at the top of the list, silicosis has for almost a century been the principal occupational disease caused by foundry operations. There are still far too many foundries producing this entirely preventable disease. On the other hand, more and more foundries have developed dust control to such a degree that it has not caused any silicosis in their employees for many years. This is the goal toward which all of us are working.

Terminology

Silicosis is readily defined as a "fibrosis of the lungs resulting from the inhalation of dust containing free silica"; it offers little grounds for misunderstanding. Pneumoconiosis, on the other hand, has caused more definition trouble than all the others put together, yet generically it is the simplest to define. It simply means, "dust in the lungs". There is no implication of what the dust is or whether or not it causes reaction.

It is a shortening of Zenker's original term, "pneumonoconiosis" which he proposed in 1866. Therefore there should be no implication of fibrosis in the term, because we now know (as Zenker did not) that there are numerous dusts which are entirely inert when deposited in the lungs, which do not cause irritation or fibrosis, and which do not predispose to tuberculosis. These have been called the "benign pneumoconioses" to differentiate them from the fibrotic pneumoconioses.

Because pneumoconiosis is a general term and covers all dusts whether harmful or not, it should have no place in occupational disease laws. There the terminology should be specific and only those pneumoconioses which may result in impairment of lung function should be included—silicosis and asbestosis.



Dust exposure at shake-out and other dust-producing operations can be readily minimized by appropriate hoods, forced exhausts, and other devices, whether the operation is manual or powered. Establishing healthy conditions is only the first step in combatting the industrial silicosis problem as it exists today.

Pathological aspects

Foundryman's silicosis is a modified silicosis. The fibrous nodules seldom are the classical whorled spheres resulting from pure quartz exposure. The old sandblasters had those before they used positive pressure helmets. Today's foundrymen are exposed to far less quartz (or free silica) dust than they are to iron and carbon dust. Dust in typical foundry atmospheres seldom contains more than 20 per cent free silica, with iron dust running from 60 to 70 per cent and carbon dust from 10 to 20 per cent.

With such atmospheres and with the total dust counts sufficiently high, a modified silicosis may result in which the fibrous nodules develop more slowly, if at all; they always are more irregular than with free silica alone, and secondary emphysema does not occur around them. There also appears to be less susceptibility to tuberculosis than with the classical quartz fibrosis.

It is because of these modifying dusts already present in foundry atmospheres that the author does not recommend the use of aluminum dusting. Workers are already getting the maximal benefit from modifying dusts without adding another modifier. The goal is to continually reduce the silica percentage along with total dust dissemination, not to add other dusts to the air.

Functionally, silicosis becomes a disease only when it is advanced or when it is complicated with tuberculosis. With early discrete nodular fibrosis, there is no interference with the exchange of gases across the alveolar membrane, and no loss of elasticity of the lungs. Only when

fibrotic nodules become confluent and massive fibrosis and secondary emphysema result is there a measurable impairment of lung ventilation.

Witnesses for this are the thousands of foundry workers with minimal silicosis who daily do their heavy physical work without difficulty and who show entirely normal ventilatory values with function tests. Exceptions are the occasional individuals with very little silicosis and high-grade obstructive emphysema. These usually are the older workers who have a naturally decreasing elasticity of the lungs combined with long-standing chronic bronchitis, bronchiolitis, or asthma, the bronchial irritation often having been caused by excessive smoking plus chronic sinus infection.

These cases cause the most medicolegal difficulties because they have real ventilatory disability which most doctors truly believe is entirely due to silicosis. Statistical studies on the incidence of emphysema in the general population at various age levels will help solve some of these difficulties. Such studies are currently being made. However, still more necessary is the constant realization that minimal silicosis never is disabling except when associated with tuberculosis, with a continuing program to educate the medical profession to these facts.

Iron dust in the lungs

Another factor in foundrymen's silicosis which bears constant repetition is the iron dust which all foundry workers have deposited in their lungs. That these iron collections contribute to the x-ray pattern of the silicosis is seldom considered in evaluating the degree of development of a case.

The amount of iron in the lungs may vary all the way from the minimal and probably negligible traces in molders and coremakers to the gross collections in welders, burners, and grinders. Some of the latter may have nodular x-ray patterns due to the iron alone which are radiologically indistinguishable from silicosis. For this iron pigmentation, Zenker's term "siderosis" is perfectly proper, provided there is no implication of fibrosis in the term.

Siderosis is as benign a form of pneumoconiosis as could be desired. It causes neither fibrosis, irritation, nor progressive tuberculosis. Yet it is being misdiagnosed as silicosis every day, and workers so affected, with or without minimal silicosis, all too often are being advised by their doctors to leave their trades. The fear caused by such well-meant but ill-considered advice has caused more disability than has silicosis itself, in the opinion of the author.

Think of iron first

The author also believes that the time has come to think first of iron when evaluating the nodular x-ray patterns of foundry workers, even when there is no doubt about there being some silicosis present as well. The first question should be, "How much of this nodulation is due to iron collections?" While the answer is not always easy or possible, it makes for far less pessimism in the prognosis when one can say that a considerable part of the nodulation is probably due to iron.

The industrial hygienist has the very important job of making foundry atmosphere increasingly safe for the continued employment of the workers. Industrial physicians, on the other hand, have the equally important job of making these workers feel secure in their chosen trade.

Workers must be assured that their lung changes will not progress to a dangerous stage with the improved dust control. New employees with minimal and uncomplicated silicosis or siderosilicosis must be accepted without hesitation and so placed that their minimal changes will not increase materially. Where this has been done it has been a major factor in helping solve the silicosis problem.

Industrial commissions, no matter who the personnel, cannot be expected to consider minimal silicosis as non-disabling as long as foundries consider such workers unemployable. The unhesitating hiring of affected workers would be a major step in the right direction. There is no reason why minimal silicotic workers cannot stay on their jobs and new workers with minimal changes cannot be hired in foundries where dust control has improved to such a degree that new cases of silicosis can no longer develop.

Reassurance, optimism

The time has come for reassurance and optimism in dealing with this problem, and the medical profession must be the first to recognize this. Such optimism is only impossible in foundries which are still producing silicosis cases; their first step must be to correct the offending dust producers. Foundries that are safe for any worker must change their employment practices and allow almost anyone to work in them.

There must be less concern about potential future liability cases, and less rejection of workers with minimal lung changes. The danger of tuberculosis developing in a silicotic lung later in life has diminished almost to the vanishing point as the opportunities for contact with active cases of tuberculosis decrease.

Moreover, workers with minimal changes acquired over a period of years will not progress to a more advanced stage of silicosis if properly placed and protected. It seems much sounder to take a chance with workers having a minimal amount of silicosis than to make them unemployable and semi-invalids.

Few offending foundries

Even though relatively few foundries today are still producing new cases of silicosis, a considerable number have old employees with varying degrees of silicosis who had their significant dust exposures many years ago. It is from this group of older workers that most of our disabled advanced cases arise.

Unfortunately, however, from time to time real cases develop in younger workers, and these special hazards need special attention. Large steel foundries, for example, make large and complicated castings with difficult cleaning problems. Cores frequently cannot be blasted or washed out, but must be dug out with pneumatic hammers. These operations have been the main silicosis producers, but have been largely solved by the development of larger and more forceful hydraulic blasters.

While the first step is to so control dusty operations that silicosis cases no longer will develop in anyone, that is not enough to solve the problem. Those who already have some silicosis must be allowed to continue their chosen work, not only for their former employers but for new employers as well.

They must be reassured by industrial physicians that they are not assuming undue risks by continuing their trades, which makes medical control of equal importance with engineering control. In fact, it must be a joint program with mutual cooperation between the engineer and the doctor. With such a team, any silicosis hazard can be adequately controlled provided the will to do the job is there.

Society's financial policies set at recent *Board of Directors meeting*

■ An important action taken by the Board of Directors at its Annual Meetings July 28-29 was the approval of definite financial policies for A.F.S. On recommendations of the Finance Policy Committee, Walton L. Woody, Chairman, the Board approved policies governing the following:

1. Investment of surplus funds in accordance with current practice in the handling of investment trust funds.

2. Establishment of a reserve fund equal to the average annual expense of the Society during the previous years.

3. Establishment of biennial budgets of Income and Expense.

4. Establishment of annual audits of the Society's financial books consistent with accepted accounting practice.

5. A statement that special funds for special projects cannot be considered a part of A.F.S. general funds until such projects have been declared by the Board to have been completed.

6. Definite policy on the preparation and frequency of financial statements.

7. Development of a "Manual of A.F.S. Policies."

The final meeting of the 1951-52 Board of Directors was held July 28 at which time annual reports of Staff officers and Board-appointed committees were presented. The Board accepted reports showing a membership of 10,033 on June 30, 1952; publication of a number of new technical books during the year; progress reports on many activities, and a report showing that the finances of the Society are in good shape and under constant control.

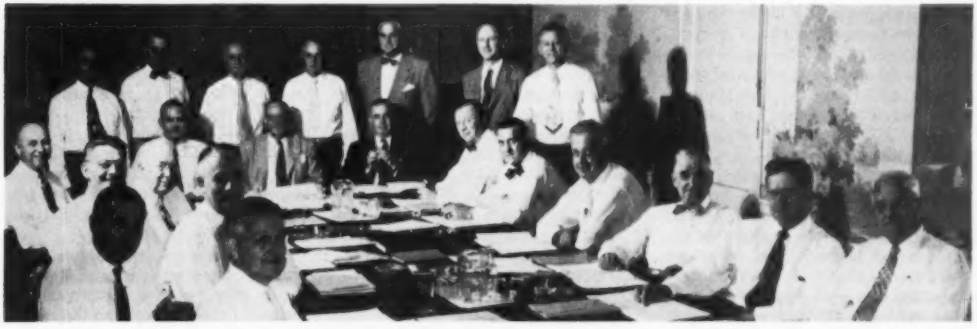
The Board directed that additional policies for the Society covering conventions, exhibits, technical activites, Chapter affairs, and education be drawn up for approval by the Board at its next meeting in November.

Following adjournment of the old Board, the new Board met in special meeting and elected an Executive Committee of the Board consisting of the following: Chairman, President I. R. Wagner; Vice-president Collins L. Carter, Past President Walter L. Seelbach, and Directors F. W. Shipley, M. A. Fladoes, and H. W. Dietert. The Executive Committee then appointed a Nominating Committee for the election of new National Officers and Directors, which will be published in the October AMERICAN FOUNDRYMAN.

At the first meeting of the new Board, Wm. W. Maloney was re-elected Secretary-Treasurer of the Society, and estimated budgets of income and expense were approved for the fiscal year 1952-53. President Wagner and Vice-president Carter were appointed the A.F.S. representatives to the National Castings Council. Other Board committee appointments will be announced in the near future. The Board also approved returning the financial books of the Society to a cash basis rather than the accrual basis in effect since 1949.

Technical Director Massari received approval for continued use of recorders rather than stenotype reporters at technical sessions of the 1953 Convention, following a successful trial in 1952. The budget for an extensive list of major new publications and for continuation of A.F.S. research projects was approved as recommended to the Board.

continued on page 84



Officers and directors present at the recent Board of Directors meeting were, seated clockwise around the table: Thomas E. Eagan, Martin J. O'Brien Jr., Lloyd D. Wright, Vincent J. Sedlon, Lloyd C. Farquhar Jr., Technical Director S. C. Massari, Secretary-Treasurer Wm. W. Maloney, Past President Walter L. Seelbach, National President I. R. Wagner, Vice-President Collins L. Carter, E. C. Troy, H. G. Robertson, J. J. McFadyen, Frank W. Shipley, and James Thomson. Standing left to right: Harry W. Dietert, J. O. Klein, James T. MacKenzie, A. D. Matheson, Martin A. Fladoes, Fred G. Sefing, and Walter J. Klayer. Meeting was held on July 28-29 at Chicago's Edgewater Beach Hotel.

Are technical graduates getting adequate training in college?

What should a technical man know to be of greatest value to his company, himself, and society? The author tells his personal views on this controversial subject, based on his experience with recent graduates and college professors who seem to sell grammar, writing, and other non-technical courses short. He invites comment from all sides, particularly from schools whose students measure up to the standards.

HIRAM BROWN / *Chief Metallurgist, Solar Aircraft Co., Des Moines, Iowa*

The technical graduate should know more than merely how to use his special skills; he should also be able to disseminate his fund of information to others for the mutual benefit of all. Failure on either count makes him incomplete, less valuable to his company, to himself, and to society in general.

■ In thinking about industry's need for technical graduates, three questions appear to require answers:

1. What has industry and society a right to expect of technical graduates?
2. What has the technical student a right to expect of his college?
3. What has the college a right to expect of earlier training?

These questions have been nebulously forming for some time, but were accentuated by recent experiences in searching for good technical graduates. During the past several years, I have spent a great deal of time doing what many other people have been doing—interviewing technical men about to graduate from college. During that time I had formed some very definite impressions, but had kept my thoughts fairly well concealed.

However, during a recent interview the prospect made a remark which literally filled the cup to overflowing. During our discussion I pointed out to him the bad spelling in his application form and letters. "So what?" he said. "What difference does it make?

As I thought of the remark, "What difference does it make?" I thought of many technical men I had worked for and with, or who I knew intimately. Some of these men came out of school at about the same time—sometimes two or more from the same school—and started working for the same company, side by side, doing the same sort of work. Now, ten or fifteen years later, there are great differences in them.

Some have become top-notch people in the same company or with other companies, but many others are still plugging along far down the line. This varies the student's query to, "What makes the difference?"

Studying the question rephrased in this manner necessitated an evaluation of the men referred to above. These men were, in my mind, arbitrarily divided into two groups, those who were labeled "successful" and those who did not rate that label. Success was evaluated from two aspects: the value of the man's services to his company, his profession, his community, or his country; and the respect in which the man was held by his profession.

What is success?

Can the "success" rating of the one group be due to sheer good fortune, or is it due principally to the men themselves, since some men are inherently more capable than others? Of course, either of these can contribute to the rating, but the similarity of the "successful" group in so many other characteristics would indicate that those two factors had only small influence on the rating. The men who were labeled "successful" had all shown marked ability to express themselves both orally and in writing, had well-disciplined minds, were unstinting in their willingness to participate in technical societies and/or committee work, and had wide fields of interest outside their specialized field—art, music, literature. They were, in brief, well-rounded persons.

Those who were not labeled "successful" were not less intelligent. As a rule they were far better versed in technical procedures than the others; many of them lived, ate, and breathed their technical work. However, they remained in a groove and left it to others to do the talking, writing, or other presentation.

Acting on the premise that these things do make a difference, I began

to break those items down into their component parts. First of all, consideration was given to the ability of men to express themselves. This is certainly tied in with the ability to spell and to use good grammar. This doesn't mean that every man is expected to be a Demosthenes or a Churchill. No one expects that!

Skilled illiterates

An engineer should, however, be able to organize his ideas in an orderly manner, write a decent report to his supervisor that will clearly express his thoughts, correctly spell the words in it, and use grammar that is good and which concisely conveys the impression he wishes to create. If called into a meeting, he should be able to talk to the group in such a manner that he makes himself understood. To sell himself or his ideas, he must be able to do that. Even at best, ideas are very difficult to transmit, so why hinder transmission by bad spelling, poor grammar, inept expression, or lack of cohesion or organization of thought?

Despite this necessity, I have found most graduating technical men I have interviewed to be very poor in all or most of these points. Have we in industry a right to expect technical graduates to have a good foundation for expression? Many of us think we have, yet there are some in the field of education who believe differently. When I stated my beliefs to a number of educators in all parts of the United States, I was given a variety of answers.

"You cannot expect that of technical men graduating from college, since when they get to college they are sadly deficient and we haven't time to go back and teach them basic English and composition."

If students applying for entrance are deficient in fundamentals such as English, do they have to be accepted? Are there no entrance requirements? Are there no graduation requirements in this respect? Are colleges institutes of learning or are they grist mills to turn out "college men" with a maximum financial benefit to the college?

"You expect too much. I'll certainly see that none of my students have to be interviewed by you."

If the attitude of that professor is reflected in his students, it is hoped that he will keep his word, since this would minimize cost, time, and trouble for all concerned.

"You expect too much. College is just a place for kids to grow up. The important thing is that they be allowed to associate with good men, such as professors, during that period. Most boys go to school without any idea of why they are there or what they want to study. If they are just allowed to grow up while in college, they'll be all right."

Many families would find four years of college an expensive growing up process if that's all that could be expected of it. Perhaps high school graduates should wait a year or two before going to college to give them a little time to mature. I find it difficult to believe that students starting to college are that immature. If they don't know why they're in college, maybe they don't belong there.

Need balanced training

Maybe some of them would profit more from a trade school than a college education. Could those be detected and advised before they waste four years? For those who don't know what they want to study, aren't there aptitude, psychological, and mechanical tests that could be used to help them find what their main interest and capabilities are? Perhaps this interim period while they are deciding should be used to teach them English and other general subjects. Maybe we need more cooperative education where the students alternate at work and school.

"We're busy training them in technical matters. You can't expect to take them right out of school and turn them loose on a job. Industry must give them some training."

Maybe schools are too busy teaching them technical details. Many who learn specific techniques in school will have to "unlearn" many of them and learn, instead, the techniques used in the place where they go to work. Basic technical knowledge is always useful, but too highly specialized knowledge at this stage may not be too useful. Let those who wish to specialize in some particular field take post-graduate study. Industry does owe it to men to instruct them in the particular methods used in that shop, elements of supervision, types of reports wanted, form of report to be used, etc., but it shouldn't have to teach fundamentals.

If industry must train men in fundamentals, then their value to the company will be almost nil for some time. Why then should we pay such a high price (salary) for raw material? Is this a deferred investment which may pay off two or five years from now? If so, that puts the small shop at a distinct disadvantage. The large companies can afford to hire a staff to spend the necessary time in training recruits, but a small shop cannot subsidize such a program.

Should the small shop, then, pass up graduates and pirate men from larger companies after they have some training? I have been advised by a number of small companies that they never try to get recent graduates. They hire men who have had four or five years of experience since graduation. They cost little more and are much more efficient.

"We know they're not good in that respect, but the responsibility goes further back than college."

Should industry start its complaining way back at high school level? Maybe more effort should be made by industry to screen boys in high school. Those that have the desire and qualifications to go to college might be encouraged to continue their education. Others might be advised to go to trade school or at least to stop after high school. If only technical training can be expected, it might be cheaper and better for industry to take trade school boys and finish polishing them up with on-the-job training courses.

"During the last year of college we send their reports to our English Department for grading, and this is included as a factor in their overall grade."

And longer exposure

Good English is not a matter of cramming facts and rules for a short time. It is a result of being exposed to training for a long time. Good English should be almost second nature. To use it well it should flow freely and not require constant straining. A man making an obvious effort to remember the hastily crammed rules is not at ease and cannot freely express himself. Any student who knows a report is to be read for English correction can minimize his troubles by deliberately avoiding words that might be difficult to spell. This would be an artificial semblance of good English, but would be better than nothing since it might make him use a dictionary.

"We think technical graduates are better than ever."

Insofar as technical knowledge is concerned, this is probably true. I believe they are better informed technically and along specialized lines than were similar graduates ten years ago. However, they may

not be better in other respects. Are we producing technical automatons who know all the technical aspects but can't make us understand them?

"Pick out the good ones and let the others go somewhere else."

In ordinary times this might be possible, but today's graduates are taken at a rapid rate. Large companies can hire a number of people, cull out the bad ones after some time has elapsed, and retain the good ones. Small companies cannot do this. Even though every effort is made to evaluate them during interviews, some of the fundamental weaknesses may not be found until later, and by that time there is no replacement choice available. Why should selecting a graduate be such a risk?

Civic responsibilities

In addition to knowledge designed to give benefits to industry and the professions, how about the debt the engineer owes to society as a whole? The question is often asked, "Why are not engineers active in civic affairs? This is, indeed a fair question. Who should be better qualified to assist on many such projects than engineers? Engineers are trained to have analytical minds which are capable of sifting facts, arriving at a conclusion, and honestly reporting the findings. Can it be that engineers are notoriously poor salesmen, and, therefore, do not attract proper attention? Or is it more probable that the average engineer simply lacks interest in non-technical affairs?

I believe that our technical graduates are too narrowly educated. I believe that the human mind is the greatest undeveloped source of power the world has. It should be developed to its utmost, not just highly developed in a certain section.

Are we training our technical people too much along military lines of specialization and regimentation? Could our narrowly trained technical people live in, or contribute any constructive thinking to, a peace time economy? All of our thinking seems to be directed toward war, not peace. War is primitive and shallow. It is the uncontrolled flaring of national tempers. It can be fought by automatons—guided missiles or guided people. Peace is intelligent and deep. It is controlled temper. It is not necessarily loving our neighbors but requires understanding them and living with them despite the difference that exist.

What are students taught that will make them realize their civic responsibilities? Are they engineers or technicians? What mental attitudes are colleges trying to build in engineers? When a number of educators were asked what humanities or general subjects were taught in their engineering curriculum, I received another variety of answers.

"None. We don't think engineers need them. We concentrate on technical subjects."

Technicians may be narrow, but engineers should not be. That is a distinguishing feature between them. To be useful to society as a whole and to be successful as an individual, wide fields of interest are vital.

"None. Most engineers are not interested in them and it would be a waste of time."

Engineers, like others, are not interested in many things unless their curiosity is excited. If exposed to the humanities, their interest would be titillated because at heart engineers are very inquisitive persons. Even though many of the subjects would be quickly forgotten, many would catch by sheer exposure factor. No one catches measles unless exposed to the germ. A cultural education is a part of the American heritage.

"None. It would not do anything to help their immediate earning power and they would prefer to spend that time of technical learning."

It might not help their immediate earning power, but it will help their future earning power and fit them for higher types of positions. It would also make their rise more rapid and make them more useful to society.

"None. We don't have time in a four year course."

"We add a fifth year to our engineering curriculum and concentrate on English and humanities then."

Permit no shortcuts

It is quite likely that a four year curriculum is not sufficient for engineers today. Why not make it five or six years and include some of the important non-technical subjects? It may cost a little more and take more time, but the results would offset this by far. Are our engineering graduates too eager to get through in a hurry just to get a sheepskin and the remunerative job that awaits them? Is economic necessity rather than knowledge the guiding force of a graduate's worth? Why should young engineers expect to rush through four years of college then rush right up the ladder of success?

Other professional fields, such as doctors, have shown that prolonged training pays dividends in the end. Certainly it means some sacrifice. Why should engineers be exempt from making some sacrifices for a good education? The top limit on jobs for engineers is very high.

For those who do not wish to make the sacrifice necessary to a prolonged education, how about two types of degrees, one for Technicians to be given after a four year, intensive technical education, and one for Engineers after a five or six year, more rounded education. There is room for both types. Some one must do the routine work while the better ones handle the executive and administrative work. Maybe we don't need so many engineers. Maybe we need only a small percentage of engineers and a large percentage of technicians. If so, why not label and pay them accordingly?

Where to from here?

All of these discussions raise questions to be answered. What mental attitudes are colleges building in our engineers? What are they teaching as values in life other than dollars and cents?

Is industry telling the schools what is needed in our engineers or is it keeping quiet and adopting the idea that it has to take what it can get?

Would industries be interested in offering on-the-job training during college (co-op schooling) if the course was five or six years longer to allow more general education?

Are high schools failing to teach fundamentals that are needed for college? If so, why can't colleges find those deficient, accept them on probation, and attempt to bring them up to par by required review or special courses?

Are parents at fault for their laxity in home training? Is industry demanding so much of their employees' time that they have little time left for their families or civic activity?

What can experienced engineering men in industry do to help the young ones going through college?

The answers to these questions would do a great deal to point out what action is required to make our engineers solid citizens as well as good technicians. I hope others have some ideas on these subjects because, frankly, I am often very confused. Perhaps my analysis is all wrong. Maybe I do expect too much. In any case, I should certainly welcome discussions from others in the fields of industry and education.

Causes of hot tears in steel

To share experiences on hot tears in steel castings seven Texas foundrymen met at the Shamrock Hotel, Houston, as guests of American Foundryman. Their informal discussion is reported below. In their enthusiasm they broadened the discussion to examine ways of introducing sand inclusions into castings. This second Round Table will be published soon.

C. E. Silver . . We know that molten steel poured into a mold freezes by forming an envelope of solid steel at the mold and core interface. On simple forms this envelope builds up with uniform thickness over the whole mold surface and no hot tears occur. In this case the casting design is such that the heat of the molten metal is dissipated at essentially the same rate from all casting surfaces, and hot tears are not a problem.

Hot tears occur at mold and core surfaces where the heat dissipation is not uniform. This may be at re-entrant angles or at hot spots. If an envelope is formed over a re-entrant angle, for example, it will be thinner than adjacent areas and as solid contraction comes into play the envelope will not have sufficient strength to withstand the stress.

Formation of hot tears seems to occur early in the development of the envelope. The envelope that has built up adjacent to the hot spot is contracting and the solidified nuclei of metal that are forming at the hot spot are severed from it. The orderly formation of dendrites is disrupted and a hot tear results. This occurs on the cored surfaces of well heads at the flange where, on a given design, it can be predicted to a fraction of an inch where a hot tear or bore crack is likely to occur.

Gerald E. Smith . . Composition is important in connection with hot tears. We normally experience them in the higher carbon steels, say, above 0.35 per cent carbon. One method of eliminating hot tears is to select your scrap for certain types of castings. We like structural plate, which we know is not contaminated with sulphur or phosphorous. We also use collapsible cores.

C. E. Silver . . Do you think that selected scrap and collapsible cores alone will prevent hot tears?

Gerald E. Smith . . Yes, where specifications do not require above 35 points of carbon.

L. O. Sturkie . . Hot tears in many cases are due to improper design. Our problem is to work with the designer and persuade him to design the casting to conform with the best possible foundry practice. High grade scrap is also important.

Gerald E. Smith . . That is correct. I think you have more trouble with tramp alloys than you do with sulphur and phosphorus, as long as you stay within limits—around 0.05 per cent.

L. O. Sturkie . . We all know that at solidification steel has very little strength. For well head castings I believe we all make cores of a sand mixture having a very high hot strength. Thus the core may not have collapsed by the time the casting has solidified. The core inside will not allow the steel to shrink, resulting in stress cracks in the castings. I think the best way to combat this is to control our hot strength in our sand. We find it better to use a low hot strength sand and minimize our stress cracks, even though this sand mixture promotes sand inclusions.

C. K. Flagg . . A good core wash may help eliminate hot tears since it gives a smoother core to which the first envelope of steel cannot cling readily. We have to go back to fundamentals and remember that the cause of hot tearing is simply a tug of war between the strength of metal and the expansion of the sand. The problem can be attacked in both the core and in the casting.

Temperature of the metal is a tremendous factor. G. A. Lillieqvist of American Steel Foundries proved that he could control hot tears by controlling pouring temperatures. He showed that he could predict and cause or prevent hot tears in a specific test casting. The question came up at another meeting and several in the group said that both hot and cold metal could cause tearing, depending on the section, shape, size of core and all the factors in a particular mold.

C. E. SILVER . . Chairman of the first American Foundryman Round Table held in Texas, he is works manager of Texas Electric Steel Casting Co., Houston. He was previously works manager of Michigan Steel Casting Co., Detroit, and of Smith Steel Casting Co., Milwaukee. His first 14 years as a foundryman were spent advancing from University of Wisconsin graduate with an M.S. in metallurgy to assistant superintendent of Sivyer Steel Casting Co., Milwaukee, Wisconsin.

Furthermore, if it has been shown that core sand inside an envelope of molten metal can actually reach a higher temperature than the molten metal through oxidation of combustible material in the core. So if you have a corner of a core sticking into molten metal a shrink will oftimes result. If you have two adjacent cores forming a T-shaped section of metal you will often see a hot tear which I think is caused by a hot spot. This would be due to combustion of core binder plus the fact that the section

is a little heavier at the intersection of the T.

O. M. Bartholomew . . There are other things that have not been mentioned with reference to hot tears, such as the location and design of the gates and risers. For instance, we're making a small casting that is giving us hot tear trouble. The carbon is low, about 0.15 per cent maximum. It's a high chromium steel and a little out of the ordinary. The steel is very sluggish—you must pour it hot and hard.

The casting is designed well from the standpoint of directional solidification but I find we have a heat affected zone where the gate joins the casting. At that point we get a hot tear which seems to be due to the design of the gate. The type of metal is also believed to be a major contributing factor.

I think the high temperature at which we're pouring—around 3050 to 3070 F at the mold—is unusually hot for steel.

C. E. Silver . . I'm not satisfied that it makes much difference as to the temperature of pouring. If you pour hotter metal it's true that you have more heat to dissipate, but you've got the same relative amount of heat to dissipate over the whole mold cavity area, and it will just be a matter of time before that envelope starts to freeze. It's lack of uniformity of freezing of the envelope or its rupture that starts these hot tears. If we could use a material on a complicated casting that would dissipate the heat in the re-entrant angles and at hot spots at the same rate as on flatter surfaces I believe we would have a casting that would not have hot tears.

The strength of the envelope would be the same all over, and (I'm assuming that our cores are collapsible) we would have a surface that would not rupture.

O. M. Bartholomew . . If we could introduce metal into a mold uniformly I believe it would be alright, but I think about 50 degrees difference in temperature makes the difference between having and not having a hot tear. In addition, risers and gates may be resisting contraction which I feel is the case in the casting I mentioned. The resistance of the gates ruptures the envelope, thereby starting a crack or hot tear.

Robert Dilbeck . . If you make a casting of that nature without any cracks in it—referring to the dendritic structure—then on annealing would there be a tendency to show cracks later?

C. E. Silver . . I don't believe so. I think that all of the hot tears we say show up after the anneal are in the casting before heat treatment. Oxidation of the surface during heat treatment accentuates tears that you haven't seen before, but I don't believe that if the crack doesn't exist before that it will come from heat treatment.

C. L. BOONE . . Started as an apprentice with Hardie-Tynes Mfg. Co., Birmingham, Ala., subsequently working as molder, foundry superintendent, salesman, and manager for foundries in Alabama, Michigan, and California. He left San Francisco to become sales and service manager for Texas Steel Co., Fort Worth, early in 1949.

LLOYD O. STURKIE . . Has been vice-president and general manager of Quality Electric Steel Castings, Inc., Houston, Texas, since 1948. Starting in sand research for Hughes Tool Co., Houston, in 1934, he became assistant foundry engineer, then foundry engineer, leaving the company four years ago for his present position.

O. M. Bartholomew . . Another factor that has a bearing on these cracks is the introduction of the proper feed metal at the right time. If a casting is improperly fed the envelope will pull in toward the center away from the mold surface. Atmospheric pressure may be involved too, but I feel that with ample feed metal you are not as apt to have hot tears as you would otherwise.

Gerald E. Smith . . These hairline cracks we're discussing occur in one of the toughest castings we have to contend with in this area. The majority of the shops use ample feed metal but the cracks still show up.

C. K. Flagg . . We went into the problem of bore cracks on one job and cured them by using two risers instead of one. We found that the bore cracks were more prominent and occurred almost exclusively on the side of the flange opposite the side that had the riser on it. When we put a riser on both sides of the flange, there were no more bore cracks. We went over all our patterns, and put on two heads instead of one, and have had very good success.

C. L. Boone . . Don't you think Mr. Flagg hit the nail on the head when he spoke of using a second riser? He had more bore cracks when he had only one riser than when he used two. Don't you think the reason for that is a more even distribution of heat?

C. K. Flagg . . I do believe that maybe another reason for the cracks. Time is also a very important factor. The more perfectly you can distribute the heat over any type of casting, the less hot tears you're going to have.

C. L. Boone . . Less trouble with shrink cracks too. I don't believe a wash has much to do with this unless it's very stiff and has no resilience. A wash is only a surface treatment and will be no better than the material behind it.

Gerald E. Smith . . A soft core which might lead to sand inclusions will benefit from a good wash. Mr. Flagg, when you took off one riser and replaced it with two, did you not gate into the two risers?

C. K. Flagg . . Into two risers.

L. O. Sturkie . . We have made quite a number of well heads without encountering too many stress cracks. We fared well along that line but had a lot of sand inclusions. Possibly we had a soft, collapsible core while you fellows were working with a hard, high hot-strength core.

I feel that it is a matter of heat distribution throughout the mold which collapses the sand at the same rate

GERALD E. SMITH . . President of Smith Steel Casting Co., Marshall, Texas, he has moved rapidly since starting his apprenticeship as a patternmaker in 1933. Rising to foundry superintendent, he joined East Texas Electric Steel Co., Longview, in 1946 as foundry products engineer, became general manager in 1947 and vice-president in 1949.

as the casting cools. We use about 8 per cent silica flour in our sand for this type of casting and this is the ingredient we use which is most likely to contribute to cracks.

Gerald E. Smith . . Are these sand inclusions burned in?

L. O. Sturkie . . The sand is on the surface. When the customer hits it with a tool he is very unhappy.

C. E. Silver . . Is it on the drag side of the core in the well head.

L. O. Sturkie . . It is on the drag side on the bottom of the core.

C. K. Flagg . . It has been suggested that chills in the core will prevent bore cracks. Why can't we do the same thing by introducing into our core a ring of zircon sand?

O. M. Bartholomew . . The casting I mentioned awhile ago which is giving us a great deal of trouble has a center core which is an all-zircon sand mix.

Gerald E. Smith . . In our well head where a 4-in. section joins a 1-in. section we are using a zircon lined core. It has an outer shell of about ¼ in. thick backed up by a natural rosin-bonded mixture for collapsibility. We're interested in forming a skin of metal rapidly to keep shrinkage from pulling or tearing the casting apart.

O. M. BARTHOLOMEW . . Foundry engineer with Hughes Tool Co., Houston, Texas, has had a variety of positions since joining the company in 1943. Prior to that he spent 18 years as a patternmaker in corporation and job shops, starting as an apprentice with Acme Foundry & Machine Co., Coffeyville, Kan., in 1925.

C. K. Flagg . . An added advantage of zircon sand is its low expansion. It is effective in eliminating hot tears.

L. O. Sturkie . . But you usually back up that material with an organically bonded sand mixture which gives off a tremendous amount of gas. I wonder if that doesn't tend to move your zircon sand and promote inclusions.

Gerald E. Smith . . We tried perlite—about 10 to 15 per cent by volume in the mixture—as an insulating material and also as back up material between the two flanges to provide better collapsibility. Results were not too good. We got the gas Mr. Sturkie mentioned and the mold flaked off. The core was not supposed to expand, but it did. Maybe we used too much water. Maybe the temperature was too high.

C. E. Silver . . I feel that we've had less tendency to have hot tears on what you might call a slightly penetrated surface, than when we have a core that will drop out and give a beautiful, smooth finish. It seems an envelope forms faster on a rough surface than on a smooth surface because of the greater surface area. Someone mentioned that metal contracting on a rough core will not contract the way it ought to. From my experience, the rougher core surface gives fewer hot tears.

L. O. Sturkie . . I believe the difference lies in the possibly more collapsible core in the case of the rougher surface.

Gerald E. Smith . . The sand that gave the rough surface probably was normally a soft sand, one that would collapse readily. The more dense the core, the better the heat conductivity. In addition, a fine sand or a smooth surfaced core would have better heat conductivity.

C. E. Silver . . If the surface is rough, it's because the metal has partially penetrated into the mold. With the rougher surface you have a lot of points of metal radiating heat and it seems to me the metal ought to freeze faster. And you've got more resistance to cracks.

Gerald E. Smith . . I can't agree. Sometimes we think we're making a hard core, and we get a hot tear. We make a soft core—a rougher core—and get a hot tear. The softer the core, normally, the rougher the tear. I think it's more the heat conductivity of the hard core than it is the softer core which collapses, that makes the break.

O. M. Bartholomew . . Are these cracks more predominant in one heat than in another, or do they occur pretty generally from one heat to the next? Do you find them when the casting is ready for shipment or before heat treatment? Possibly you have quench cracks. So many things may cause these cracks, you can't blame any one particular factor. Perhaps you have two or more contributing to the defect.

C. E. Silver . . Quench cracks are a different type of rupture. Hot tears are formed during solidification but are more predominant and easier to see. After heat treatment they show up better than before.

Seems to me we've discussed this subject of cracks or hot tears to

some definite conclusions. I think we've agreed they can occur even though a casting is properly fed. What else have we agreed on?

C. L. Boone . . Heat distribution. Proper—not necessarily uniform—heat distribution.

O. M. Bartholomew . . What about sulphur, phosphorus, and tramp elements?

Robert Dilbeck . . The maximum on sulphur and on phosphorus should be 0.04 per cent and copper, tin, and chromium should be below 0.02 per cent.

Gerald E. Smith . . If you want to turn out castings without hot tears you better keep sulphur and phosphorus lower than the 0.05 per cent written into the specification. They should be below 0.03, which is hard to obtain with the average scrap available today, but it can be done.

C. K. Flagg . . I haven't heard of chromium as contributing to hot tears. I have heard that copper is detrimental in that respect, but we make steel daily with one per cent or better of copper and it shows no indication of hot tearing more than other steel. Higher than the normal amount of sulphur is the most dangerous. The amount of residual iron oxide is also a factor. It is known that over-deoxidized steel as well as steel too high in iron oxide is more liable to hot tear.

C. E. Silver . . You make me so happy admitting that the way a particular heat is made can be conducive to hot tears.

Gerald E. Smith . . Our metallurgist will agree whole-heartedly, and also he agrees on good scrap and the importance of low residual elements. He can get low on scrap and get into generators still containing small pieces of copper wire—then we get into hot tears.

C. E. Silver . . Mr. Flagg, do you feel that perhaps copper as a tramp alloy rather than as a controlled alloy may be conducive to hot tears? Are some percentages of copper safe to use while others are not, from the stand point of hot tearing?

C. K. Flagg . . I'm not acquainted with the low percentages of copper because we've never analyzed for residual copper, but I know we get it in many of our castings because of the possible mixture of copper bearing steels with our normal plant carbon steels. Maybe I should look into this situation.

Gerald E. Smith . . There is a safe limit on copper.

C. K. Flagg . . You wouldn't be having trouble with brass or bronze that contains tin, would you? We know that tin is detrimental.

C. K. FLAGG . . Steel foundry superintendent for Ross-Meehan Foundries, Chattanooga, Tenn., since late 1951, he has had 23 years experience as a steel metallurgist in Pennsylvania and Texas and two years as an inspector. He studied at University of Michigan and Carnegie Institute of Technology.

L. O. Sturkie . . I agree with Mr. Flagg.

Robert Dilbeck . . We've checked our copper and tin and we haven't had too much difficulty with copper. We've had as much as 25 points of copper without being able to pinpoint it as the direct cause of hot tearing. In our rolling mill we've done some work on carbon steel and have traced our trouble to tin.

C. E. Silver . . What do you consider your danger point on tin?

Robert Dilbeck . . I think about 10 points, about a tenth of a per cent.

ROBERT DILBECK . . Had his foundry career interrupted by four years as a bomber pilot, participating in 11 major campaigns and earning four air medals and two presidential citations. Before becoming assistant electric furnace superintendent for Texas Steel Co., Fort Worth, he was a chemist with Globe Laboratories in the same city.

Gerald E. Smith . . I read somewhere it is 0.05 per cent.

C. E. Silver . . We consider 0.04 per cent is the danger point.

Robert Dilbeck . . I think deoxidation practice should be brought into this discussion a little more.

C. K. Flagg . . Whether you use aluminum or not has a good bit of effect on grain size but I don't know whether grain size has any effect on heat tearing. I think Mr. Silver's introduction to the subject regarding dendritic structure is important because with coarse dendritic structure you have a greater tendency toward segregation. This allows sulphides to agglomerate and to create a weakness which produces hot tears. And dirty steel tends to be more subject to hot tears than clean steel, especially a dirty steel that has nonmetallic inclusions in chain type formations.

Robert Dilbeck . . Mr. Smith, you have experienced more hot tears in medium carbon steels, about 0.35 per cent. How does the carbon enter into it? Is it fluidity, or solidification rate?

Gerald E. Smith . . Our sad experience was with carbon closer to 0.45. I'm not sure how carbon enters the picture.

C. K. Flagg . . It may go back to your melting practice. It's more difficult to work a heat normally and finish with a higher than normal carbon. Possibly the working and finishing of a heat does have an effect on hot tears. Finishing a heat high in carbon would automatically go with a below-normal residual iron oxide content. If you boil down to the same level of carbon in all grades of steel, then recarburize back in the furnace, you knock out a good bit of your iron oxide, so you may have an over-reduced heat.

Gerald E. Smith . . I'm more inclined to think it's the carbon in the 0.45 or above 0.35 carbon steels rather than melting practice that causes the trouble. But Mr. Flagg may be correct. It's something for me to check when I get back to the plant.

C. E. Silver . . Evidently we've reached our last conclusion, that perhaps the working of a heat can affect hot tearing tendencies in steel.

S & H & AP Program reports progress and prospects

Steady progress has been the 1951-52 record of the Safety & Hygiene and Air Pollution Program. And there is promise of much more to come. Here's the story briefed for you from Director F. W. Shipley's report to the A.F.S. Board of Directors on July 28.

■ Much of the year 1951-52 was devoted to the organization of the new S&H & AP program and to the initiation of fund solicitation. Program policies were established by a steering committee with J. R. Allan of the International Harvester Co., Chicago, serving as chairman. Directed by this group, working committees were activated for the development and presentation of specific information and requirements.

A committee on welding, for instance, was assigned the task of developing a welding code for adoption by the State of Illinois. This work, completed in January 1952, is expected to form a pattern for similar state codes. The committee also plans to use the information developed for a *Recommended Good Practice Manual on Welding* for use throughout the castings industry.

At present a committee on dust and ventilation is preparing a *Dust and Ventilation Control Manual* for the foundry industry. An extremely active group, this committee in cooperation with the University of Michigan, sponsored a conference on "Health Protection in Foundry Practice" which was designed primarily to meet the needs of small and medium-sized foundries. Instead of an expected attendance of 60, over 100 were registered.

Twenty technical papers were presented in addition to regular discussion and instruction sessions. In response to the many requests for copies of the conference papers, the Society is having them reprinted in booklet form.

Similar conferences are being promoted in cooperation with the University of Illinois and the University of Wisconsin. Through such conferences A.F.S. plans to disseminate technical information on safety, hygiene and air pollution practices to an increasing number of small and medium-sized foundries that do not have the technical staff necessary to develop such training programs. Operating people attending these conferences can develop the necessary "know-how" to initiate health and safety programs in their own plants.

Air pollution

Study of air pollution, a primary reason for developing the present A.F.S. program, is being advanced by a special committee with personnel of high training and broad experience. Work is underway on a *Manual of Recommended Practice for the Control of Air Pollution by Foundries.* Already a complete outline has been developed. However, the work must develop slowly; the subject is new and there is little authentic information available for broad community application. Another cause for temporary delay was the resignation of Staff Director K. M. Morse in March, 1952. The new director, W. N. Davis, was not appointed until May.

Members of the committee presented papers at the annual meeting of the Air Pollution and Smoke Prevention Association of America (now the Air Pollution Control Association) in June. The committee also sponsored, for the first time at an A.F.S. Convention, a program of technical papers at the International Congress in Atlantic City. These papers are being compiled and will be published by A.F.S. in booklet form. It will be available to all foundries in the near future.

At present there is no specific or complete body of information concerning air pollution in the foundry industry. The Air Pollution Committee proposes to gather much of the data produced by individuals, committees of industry and associations. Such information will be checked for accuracy and tabulated in library form for reference purposes. In addition, A.F.S. will conduct field tests and surveys aimed at developing practical means whereby the average foundry may solve its own problems in this field.

Much information has been compiled on various methods of air pollution control. However, foundry experience in Southern California has shown that existing equipment cannot be sponsored as standard for all foundries throughout the country—at least not without incurring extreme economic hardship in many cases. Reports of practical and economical installations must be investigated and information compiled on their use and the results.

The work on air pollution, long ignored by the foundry industry, now requires concentration and thorough development, even at the risk of further delay in rendering assistance on individual foundry problems.

Legislative

For reference purposes, A.F.S. has compiled existing information on legislation and codes which affect safety, hygiene and air pollution practices. Program officials are also studying the steps being taken toward further governmental regulations. An informative bulletin is soon to be issued to those participating in the Society program.

More and more states are contemplating laws covering industrial safety, and appointing or increasing the existing number of factory inspectors. Two recent bills introduced in the U. S. Congress, the Humphrey Bill No. S-2325 and the Murray Bill No. S-2714 were referred back to committee at the last session of Congress. Both bills were intended to provide state funds for increased factory inspections, indicating the current trend of governmental regulations.

It could be suggested that foundries improve their accident frequency rates voluntarily rather than wait for government inspectors to direct such activities. High accident fates in the smallest industrial plants and

increasing state legislative acts affecting such plants, have led the National Association of Manufacturers to initiate a safety and hygiene program for all industry with primary emphasis on solving the problems of smaller plants. The director of the A.F.S. safety & hygiene program has been asked to serve on this committee.

Safety Committee

Recently A.F.S. appointed a safety committee headed by John W. Young, International Harvester Co., Chicago. First task of the committee will be to review and revise the *Recommended Safety Code for Foundries* which was developed by A.F.S. and adopted by the American Standards Association as an "American Standard" in 1932. A safety manual then will be prepared in a recommended-good-practices rather than in the code format.

Several years ago a foundry safety film was proposed by the National Safety Council. The plan was not then accepted by the various foundry associations. The film script developed at that time is still available. Its revision and improvement is a project for the safety committee. Later on, foundry safety films may be developed covering specific foundry hazards. Publishing of separate safe-practice pamphlets is also being considered.

Immediate objective of the safety committee is the presentation of several foundry safety courses in the Chicago area during 1952-53. These training courses will be planned primarily for personnel of smaller plants, since the majority of such plants do not have safety programs or supervisory personnel who have had safety training.

First of the safety courses in the Chicago area is planned for October 1952, as announced on page 36 of this issue. If successful, such courses may be developed and made available to chapters of A.F.S. throughout the country.

Various Safety & Hygiene & Air Pollution committees are arranging to provide a form of consulting service for the industry. The objective will be to answer specific questions and render assistance on practical foundry problems related to safe practices and air pollution control.

As a practical operation, such service will be confined to correspondence on specific requests. A.F.S. has no intention of setting up a consulting engineering service on safety, hygiene and air pollution practices, but members of the various committees have offered to render assistance where the services of a consulting engineer may not be required.

Finances

The A.F.S. program gives promise of a year of considerable achievement in line with its accepted obligation to the metal castings industry. Obviously such achievement will be dependent in large degree upon the willingness of the industry to support the program financially. Anticipation of such support is in line with the expressed request of the National Castings Council that A.F.S. undertake the job.

As of August, 1952, the industry has supported the program only to the extent of contributions totaling $42,000, although a minimum program of 10 years calls for at least $350,000. As pointed out originally, the Society believes that the industry will provide the funds to develop its own engineering standards, rather than waiting for governmental agencies to do the job.

Solicitation of funds on a broad scale throughout the industry is being organized through a finance committee of management. It is hoped that the entire $350,000 may be contributed over a period of three years so as to assure at least a minimum continuity of the program.

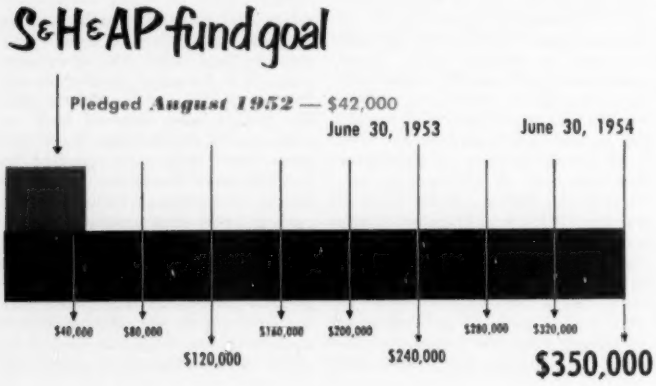
S & H & AP contributors August 1 to 31

Asbury Graphite Mills, Inc., Asbury, N. J.
Black Products Co., Chicago.
Charles Pettinos, Inc., New York.
Buckeye Products Co., Cincinnati.
Federal Foundry Supply Co., Cleveland.
Frederic B. Stevens, Inc., Detroit.
George F. Pettinos, Inc., Philadelphia
Hansell-Elcock Co., Chicago
Hill & Griffith Co., Cincinnati
J. S. McCormick Co., Pittsburgh, Pa.
M. A. Bell Co., St. Louis, Mo.
Penn-Rillton Co., New York
Smith Facing & Supply Co., Cleveland
S. Obermayer Co., Chicago
Springfield Facing Co., Harrison, N. J.
Superior Flake Graphite Co., Chicago

▶ *Educational Foundation news from Alabama and Michigan*

■ Two apprentices will enter the University of Alabama on Foundry Educational Foundation sholarships this fall to study metallurgy and foundry practice. They are Gene A. Gorham, apprentice patternmaker, Stockham Valves & Fittings, Inc., Birmingham, Ala., and Harry D. Bradshaw, molder apprentice, Newport News Shipbuilding & Dry Dock Co., Newport News, Va. Though not the policy of the university to grant FEF scholarships to freshmen, the apprentices are receiving help which is expected to be continued by their employers after they have shown good performance in college.

The University of Michigan is changing its foundry layout and extensively re-equipping the foundry laboratory. Members of the Foundry Educational Foundation Advisory Committee for the school are aiding in raising contributions and equipment for the program which will cost in the neighborhood of $250,000.



Design-production teamwork is key to steel foundry gains

J. O. FELT / *Steel Founders' Society of America, Cleveland*

Recognizing the paramount importance of correct production design adapted to sound foundry practice, engineering teamwork is earning increasingly widespread attention as the key to significant production engineering advances in the steel casting industry. This article details how castings can be improved through the use of cooperative design, and how jobs normally lost to the foundry can be captured.

■ Emphasis on consultation of design and foundry engineers is blueprinting the way to timely manufacturing gains, while providing a practical means of easing some of the complex problems of high level production, supply, and selection of critical materials.

The engineering teamwork approach is paying off in steel foundries almost everywhere, and for the foundries' customers in more than 100 heavy industries. Mutual benefits accrue progressively to supplier and buyer alike as designers and foundrymen join in closer understanding of respective problems and work together to fit requirements of one to facilities and techniques of the other.

More economical production, improved parts, advances in functional or physical design characteristics, better producibility, greater dependability, and other tangible gains are among the obvious results; and among these, none perhaps is currently more important than the vital factor of metal conservation.

How insistence on foundry engineering continues to spell consistent progress is demonstrated in many graphic case record examples available in product development files. Firm adherence to the principle has become a guiding force in achieving the many advantages possible in new design or redesign of engineered structures which still embody the necessary characteristics of quality, utility and essential strength.

Experience has demonstrated conclusively that foundry-engineered products result in substantial savings for both the customer and the foundry. Products thus developed have resulted in balance sheet savings ranging from 15 to more than 38 per cent, customer relationships firmly cemented on the cooperative basis, and greater confidence in the dependability and versatility of steel castings.

Fig. 1 . . . Original design for cast steel drive spacers for tractors. In five different sizes, parts were expensive to produce as unit castings.

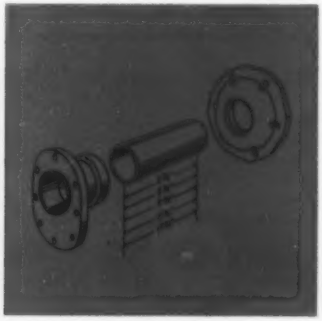


Fig. 1a . . . Redesign and conversion to cast-weld technique solved the problem. Two simple machined steel castings were joined by a piece of pipe.

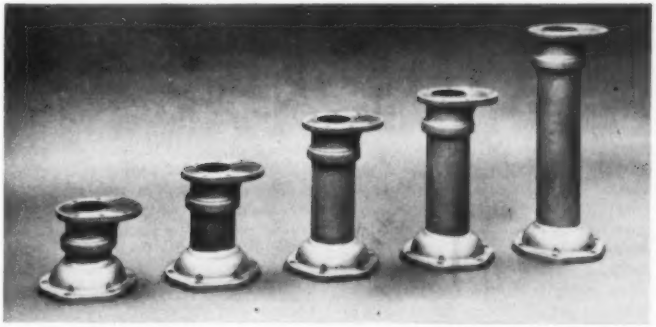


Fig. 1b . . . Redesigned spacers have proven themselves in actual performance. Cost has been cut 38.4 per cent, and 30 per cent less steel is being used.

Consider, for instance, one foundry's solution—starting at the drawing board stage—of problems encountered in the production of tractor drive spacer parts in which the strength, shock and fatigue resistance, and stability of cast steel were considered indispensable.

As originally designed to meet five different size requirements, the drive spacer units (Fig. 1) were expensive to produce as one-piece steel castings. Each size would require a separate set of core boxes

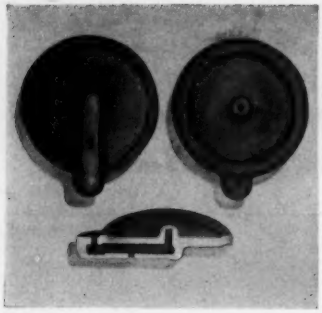


Fig. 2 . . . Before redesign, hydraulic cylinder head castings leaked; the oil pipe part was difficult to clean.

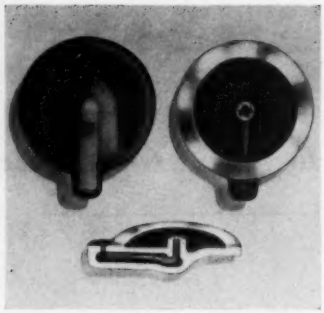


Fig. 2a . . . Redesign ended the leakage and brought 18.3 per cent reduction in cost. Cleaning is simplified.

Fig. 3 . . . Trailer axle, originally designed as welded fabrication, was weak, ugly, and hard to make.

and pattern equipment, separate sets of flask equipment, and subsequent expensive cleaning and handling procedures; separate machining set-up, entailing expensive jigs and fixtures; and use of an excessive amount of critical steel, weight for the five sizes averaging 52.5 pounds.

Collaboration between customer engineers and the foundry's engineers brought about pertinent design changes and agreement on use of cast-weld techniques which afforded simple but eminently satisfactory solution of the basic problem: redesign to incorporate the use of two simple machined steel castings plus one piece of pipe cut to required length and welded to the steel castings to fit specification needs for each of the five requisite sizes of drive spacers (Fig. 1a).

The direct result is that the tractor parts now are being produced in the five sizes at greatly reduced cost, plus valuable conservation of critical metal (Fig. 1b). Total cost of the part was reduced 38.4 per cent; 30 per cent less steel was required, average weight being reduced to 37.1 from the original 52.5 pounds. Economy and efficiency were made possible through use of a single set of inexpensive pattern equipment, single core box and flask equipment, simplified cleaning and handling, etc.

Teamwork on design and other engineering aspects similarly eased problems encountered in the production of cast steel hydraulic cylinder heads. As made to customer specification (Fig. 2), the head castings developed a number of leakers. The casting was overly expensive to produce, cores were expensive and difficult to hold in place during the foundry operation, and great difficulty was encounterd in properly cleaning the oil pipe portion of the casting after installation.

Analysis indicated obvious need for elimination of uneven metal sections, and showed that weight must be decreased, provision be made to secure better anchorage of cores, and that molding and cleaning be made simpler and less expensive. Redesign of the part was accepted as the answer, and the foundry-engineered result (Fig. 2a) brought an end to the problems as well as a cost reduction of 18.3 per cent. An added gain was the elimination of excessive metal and improved foundry practice through the addition of core prints to provide better venting and anchoring.

Further convincing evidence of benefits obtainable through cooperative action of manufacturer and steel foundry engineers is another example highlighting conversion redesign as the frequent medium of solving parts production problems.

Production of a trailer axle, originally designed as a welded fabrication (Fig. 3), was found to be impractical from the standpoint of cost and also in point of pressing delivery requirements. The fabricated part lacked necessary strength, poor appearance of the part was detrimental to sales appeal, and the manufacturer's problem was compounded by inadequacy of machine facilities to handle the numerous parts.

Foundry engineering analysis showed that conversion to a steel casting would be both practical and preferable, since quantities were too small to warrant the expense of forging dies, yet too large for economical production by welding. Furthermore, it was readily apparent that appearance of the part as a one-piece steel casting would be greatly improved, and that the need for better weight-strength ratio would be obtained through better distribution of the metal.

Subsequent redesign and conversion resulted in quantity production of a steel casting (Fig. 3a) which could be rapidly made from relatively inexpensive pattern equipment. This put an end to customer delivery headaches, solved the problem of sales resistance through improved eye-appeal of the part, and provided a compact trailer axle unit capable of meeting all service requirements. Total cost of the part was reduced 28.2 per cent.

That properly designed steel castings not only result in reasonable costs but very often produce a superior product with distinct advantages is evident in another case record. Original design of a machinery hinge bracket (Fig. 4) proved too expensive for production. Outside position of the bosses necessitated a large number of cores and added greatly to costs, the cored hinge pin holes had to be in line and parallel with the triangular shaped base, and stress load on the casting was in such a direction that internal and external ribs were placed in bending strain rather than in direct tension or compression.

Reconsideration of design factors made clear that lower cost could be achieved through reduction of weight, and that excessive cores had to be eliminated. Foundry analysis also indicated that provision had to be made for cores that would insure that dimensional requirements were met, and that ribs be placed where they would do the most good.

Redesign (Fig. 4a) resulted in an improved steel casting with weight reduced about 20 per cent from 12.2 to 9.8 pounds. The bosses were placed on the inside, eliminating

Fig. 3a . . . Redesign as one-piece casting cost 28.2 per cent less. Production schedules are now being met.

Fig. 4 . . . Original design of machinery hinge bracket proved too expensive. Stress was in wrong direction.

Fig. 4a . . . Redesigned part is 20 per cent lighter, ribs are under compression, cost is 15.9 per cent less.

two cores and reducing cost while improving appearance of the part. Cores for hinge pins were made integral to insure alignment with the base, and ribs were redesigned to place them in compression. Cost was cut 15.9 per cent.

When produced as weldments built up from 13 pieces of steel plate, the rockers and stop brackets for an end dump hopper (Fig. 5) were expensive to make and presented certain troublesome production problems. The weldment design required separate right and left hand parts, welded construction meant high machining costs and overload on machine shop capacity of the manufacturer, and weight was excessive.

Conversion to foundry-engineered steel castings (Fig. 5a) effected a cost reduction of $5.48 per hopper, cut the weight 8.55 per cent from 117 to 107 pounds through better weight-strength ratio, simplified production by making parts interchangeable, eliminated all machining to step up production of hoppers, lengthened life of individual parts, and improved their appearance.

Underlying the record of industrial gain directly attributable to the foundry engineering program is the acceptance and practical use of the basic principle that seldom can any structure be considered so perfectly designed that improvement is impossible. Out of this recognition of design as the key to improved practice and better products, steel foundries are continuing to find a larger and more permanent market for their products. As a corollary, there are noteworthy advances in meeting customers' requirements. More economical operations result; and dollar and cents savings, in many cases, are being matched by savings in critical metal supply.

Fig. 5 . . . Produced as a weldment built up from 13 pieces of steel plate, the rockers and stop brackets for end dump hopper were expensive and hard to make. Right and left-hand parts were needed, machining costs and weight excessive.

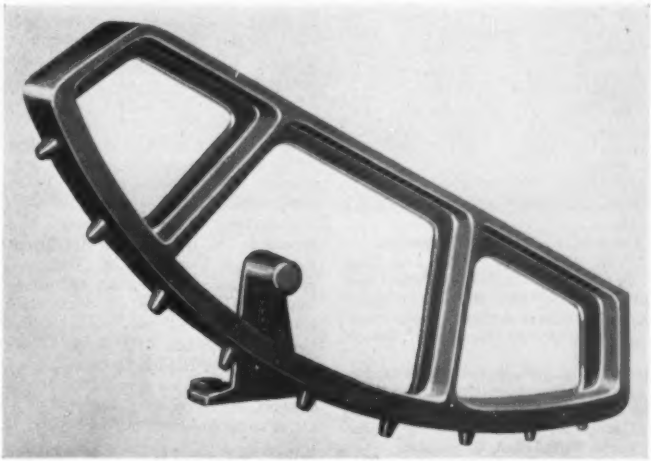


Fig. 5a . . . Converted to steel castings, modified design of rocker and stop bracket effected cost reduction of $5.48 per hopper, cut the weight 8.55 per cent, and simplified production by making parts interchangeable. Other advantages include elimination of machining, longer life, and better appearance.

Foundry groups across country announce

Regional conference programs

■ Seven regional foundry conferences will be held before the end of the year in the East, Middle West, and Pacific Northwest, Canada and Texas.

First 1952-53 regional is the 5th Ohio Regional, Ohio State University, Columbus, Ohio. Full program was published in the August issue of AMERICAN FOUNDRYMAN, page 47.

Michigan Regional

Technical sessions will be held in the University of Michigan Union, October 17 and 18, with luncheons scheduled for the Union, and a banquet at the Country Club.

Jess Toth, Harry W. Dietert Co., Detroit, is conference chairman. Working with him are representatives of six Michigan chapters of A.F.S., the University of Michigan and Michigan State College. Sponsors of the Michigan Regional are the Detroit, Saginaw Valley, Central Michigan, and Western Michigan Chapters, the two schools, and the student chapters at the two educational institutions.

Housing reservations for the Michigan Regional can be made through Wm. Spindler, Dept. of Metal Processing, College of Engineering, University of Michigan, Ann Arbor.

The following program has been announced for the Michigan Regional:

FRIDAY, OCTOBER 17

9:00 a.m. . . REGISTRATION. Michigan Union.

9:30 a.m. . . CONFERENCE OPENING. Prof. Richard A. Flinn and Dean G. G. Brown, University of Michigan.

10:00 a.m. . . *"Shell Molding of Automotive Crankshafts,"* Harry Day, Auto Specialties Mfg. Co., St. Joseph, Mich.

11:00 a.m. . . W. S. Pellini, Naval Research Laboratory, Washington, D. C.

12:30 p.m. . . LUNCHEON. Address by George K. Dreher, Foundry Educational Foundation, Cleveland.

2:00 p.m. . . GROUP MEETINGS. (Nonferrous to be announced.)

Cupola . . *"Cupola and Malleable Iron Melting,"* Frank B. Rote, Albion Malleable Iron Co., Albion Mich.

"Basic Cupola Operations," W. W. Levi, Lynchburg Foundry Co., Radford, Va. *"Acid Cupola Operation,"* Howard H. Wilder, Vanadium Corp. of America, Detroit.

4:30 p.m. . . INSPECTION TOUR. University of Michigan foundry and laboratories.

7:00 p.m. . . BANQUET. Country Club. Guest speaker, Paul Bogwell, Head, Written and Spoken English Dept. Michigan State College.

SATURDAY, OCTOBER 18

9:00 a.m. . . GROUP MEETINGS.

Metal Flow . . *"A Study of Fluid Flow,"* R. F. Thomson, General Motors Corp., Detroit.

Nodular Iron . . *"Recent Developments in Magnesium-Treated Iron,"* D. J. Reese, International Nickel Co., New York.

10:30 a.m. . . GENERAL MEETING. *"How General Motors Foundries Coordinate,"* L. A. Danse, General Motors Corp., Detroit.

Northwest Regional

The 3rd Annual Northwest Regional Foundry Conference, sponsored by the Washington, Oregon, and British Columbia Chapters, and the Oregon State College Student Chapter, will have the Oregon Chapter and OSC student group as hosts. All sessions will be held in the Multnomah Hotel, Portland. In addition to technical meetings and demonstrations, there will be a dance following the banquet, and a special ladies' program.

Chairman of the Northwest Regional is W. R. Pindell, Northwest Foundry & Furnace Co., Portland. Reservations for housing (Multnomah Hotel) and for all conference activities should be made with: George C. Vann, 2345 S. E. Gladstone St., Portland 2, Oregon.

Opening with an evening technical session, the Northwest Regional program is as follows:

FRIDAY, OCTOBER 24

1:00 p.m. . . REGISTRATION OPENS. Multnomah Hotel lobby.

Exhibit of non-destructive testing equipment will be on display throughout afternoon and evening.

7:30 p.m. . . *"Non-Destructive Testing,"* S. H. Graf, Director, Engineering Experiment Station, Oregon State College.

SATURDAY, OCTOBER 25

9:00 a.m. . . *"Modern Core and Molding Sands,"* Charles B. Schureman, consultant.

12:00 noon . . LUNCHEON. Address by Dean George W. Gleason, School of Engineering, Oregon State College.

2:00 p.m. . . *"Use of Mineral Perlite in the Foundry,"* Edward D. Boyle, Puget Sound Naval Shipyard, Bremerton, Wash.

3:30 p.m. . . *"Olivine in the Northwest Foundry,"* W. A. Snyder, University of Washington.

7:00 p.m. . . BANQUET. Address by Richard L. Neuberger, author, lecturer, and civic leader.

Dance. Van Armitage and orchestra.

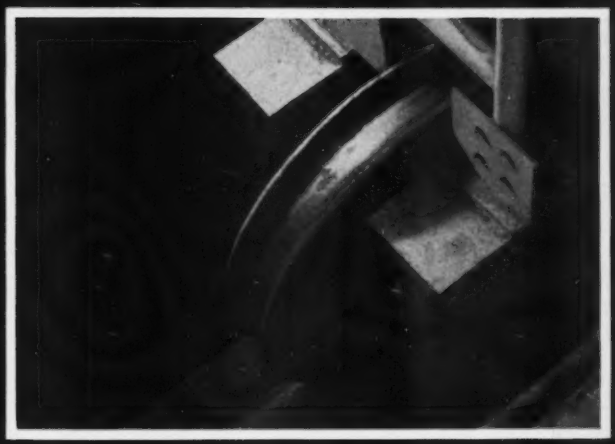
For the ladies, a special program starts with a lunch at 11:00 a.m., Saturday, October 25. Following will be a talk on *"American Heritage"* by Mrs. Rozaline Walton, Heitkemper Jewelers.

While the Northwest Regional is going on in Portland, Ore., the New England Regional will be held at Massachusetts Institute of Technology, Cambridge, Mass.

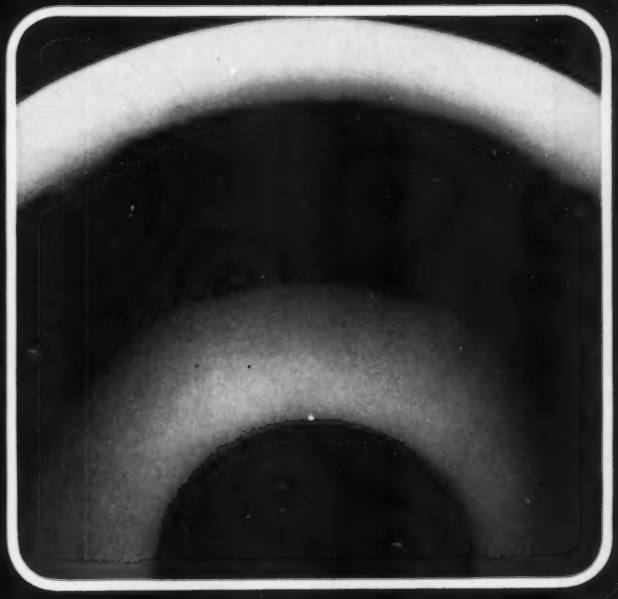
All-Canadian Conference

The 4th All-Canadian Foundry Conference will be held at the Mount Royal Hotel, Montreal, Que., with technical meetings and plant visits November 6 and 7 and technical meetings and a football game November 8, according to Conference Chairman A. E. Cartwright, Crane Ltd., Montreal. A dinner and special entertainment are scheduled for the evening of November 7. Following registration the morning of Thursday, November 6, the conference will open with a luncheon. Thursday afternoon and Friday morning are reserved for plant visits.

The Southwest Regional will be held November 13-14 at Hotel Baker, Dallas, Texas. J. R. Hewitt, Houston, is chairman.



Big loads going up—



so RADIOGRAPHY checks the crane wheel

YOU'RE dealing with big stresses and strains when you jockey multi-ton loads of metal around your plant. Every part of the crane must be ready for its job—with an extra margin.

That is why this crane wheel was checked by radiography. It was the one way to prove whether gas pockets or other internal defects might exist to cause a hazard.

Foundries working with all kinds of metals and alloys are finding it increasingly important to radiograph their castings. Then they know only quality products are released. Also in planning long production runs, radiography of pilot castings often indicates ways to improve methods and increase yield.

See your x-ray dealer. He'll gladly show you how radiography can increase your production and improve quality. Also send for a free copy of "Radiography as a Foundry Tool."

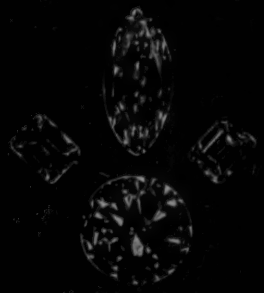
EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N. Y.

Radiography . . .

another important function of photography

Kodak
TRADE-MARK

When you have an eye for quality....nothing but the finest is ever acceptable



Courtesy of DeBeers Consolidated Mines, Ltd.

FERRO-SILICON 50 65 75 85 90%
LOW CARBON FERRO-CHROME SILICON
SPECIAL BLOCKING 50% FERRO-SILICON
FERRO-MANGANESE
HIGH CARBON FERRO-CHROME
BOROSIL SIMANAL
BRIQUETS
SILICON ✲ MANGANESE ✲ CHROME
SILICO-MANGANESE

Ohio Ferro-Alloys
CORPORATION

has, for the past quarter century, offered the iron and steel industry the best obtainable Ferro-Alloys.

Immediate delivery. Inquiries are invited.

PHILO · TACOMA · BRILLIANT

Ohio Ferro-Alloys Corporation
Canton, Ohio
Chicago Detroit Pittsburgh Tacoma Seattle
Minneapolis Birmingham San Francisco Los Angeles

SALES AGENTS AND WAREHOUSES:
SAN FRANCISCO AREA — Pacific Graphite Company, Inc., Oakland 8, California.
LOS ANGELES AREA—Snyder Foundry Supply Company, Los Angeles 11, California.
MINNEAPOLIS AREA — Foundry Supply Company, Minneapolis, Minnesota.
DENVER, COLORADO—Metal Goods Corporation.
CANADA—Overseas Commodities, Ltd., Vancouver, B. C.
MEXICO—CIA. Proveedora de Industrias, S. A. Mexico, 6, D. F., Mexico.

SALES AGENTS, NO WAREHOUSES:
NORTHWEST AREA — E. A. Wilcox Company, Arctic Building, Seattle 4, Washington; Phone Mutual 1468.

BIRMINGHAM DISTRICT—Schuler Equipment Company, First National Building, Birmingham, Alabama.

See West Europe and England on 1953 A.F.S.

International Congress Tours

■ Here are the proposed itineraries for the two European tours now being organized by A.F.S. for American foundry executives and their ladies who attend the International Foundry Congress in Paris, September 20-27, 1953.

The first "Paris in '53" tour, will wind up at the Paris Congress. It will provide for 37 or 38 days (depending on steamship sailing dates) with approximately the following distribution of tour time: England 8 days; Holland 3 days; Belgium 5 days; Germany 3 days; Switzerland 8 days; France 10 days. This tour will include 16 or 17 separate sightseeing trips to many scenic and historical spots, involving a total of between 14 and 17 days of special excursions. English-speaking guides will accompany each sightseeing trip. The entire tour will be available at an all-expense cost of approximately $1800 per person.

The post-Congress Tour will begin with the Paris International. It will allow approximately 40 days in Europe, depending on steamship sailing dates. There will be 9 days in France, 12 or 13 in Italy, 6 in Switzerland, 3 in Germany, 4 in Belgium, and 5 or 6 in England. More than 20 sightseeing trips have been planned for this tour, providing some involving a total elapsed time of 18 or 20 days. The entire tour can be taken at an approximate, all-inclusive cost of $1900.

The pre-Congress trip will be known as Tour "Blue," the post-Congress Tour as Tour "Green." Both will be conducted on an all-expense basis by one of the world-wide travel agencies. The rates quoted cover first-class, transatlantic, steamship passage (including all meals in crossing) with average stateroom accommodations; first-class rail, steamer or motor coach travel between all points in Europe; all sightseeing trips by motor coach; twin bedroom accommodations with private bath at deluxe hotels; Continental breakfast and table d'hote dinners throughout the European tour (except possibly in Paris and London); all transfers of hand luggage between depots and hotels; a personal escort for each 25 to 35 persons in the party; all group tips which are calculable in advance; English-speaking guides, and all admission fees required on sightseeing trips.

While the tours are being set up for steamship travel to and from Europe on famous transatlantic liners, those desiring to fly in either direction can make such arrangements. Standard itineraries also can be altered in advance to meet the desire of any person. All reservations, tickets, and accommodations will be arranged by the travel agency selected —not by A.F.S. The name of the agency will be announced at the earliest possible date.

The pre-Congress Tour "Blue" will arrive at Southampton and establish headquarters in London. Plant visits will be arranged through the Institute of British Foundrymen, with time provided for visiting Scotland, the Cotswolds, and other points of interest before crossing the Channel by night boat from Harwich to the Hook of Holland. Headquarters in Holland will be in Amsterdam, and sightseeing will include Markem and the Hague, with plant visits arranged through the Dutch Foundry Association. In Belgium, Brussels will be the headquarters for sightseeing trips to Ghent and Bruges. Plant visits there will be arranged by the Belgian Foundry Association and Fabrimetal, the over-all metallurgical association.

In Germany the tour will visit Cologne and Coblenz, go by Rhine steamer to Wiesbaden, and will see Heidelberg. It is expected that foundry visits will be arranged through the German Foundry Association. In Switzerland the tour will visit Zurich and Schaffhausen, Lucerne, Interlaken, Montreux, Geneva and Lausanne. Plant visits will be arranged through the Swiss Foundry Association.

Arriving in France participants in the tour will stay at the official

continued on page 81

Typical places of interest in France awaiting foundrymen and their ladies during the A.F.S. 1953 International Foundry Tours—Place de la Concord, sidewalk cafes, Place de l'Opera and fabulous beaches like the one at Nice.

National officers

PRESIDENT

***I. R. Wagner**
Electric Steel Castings Co., Indianapolis

VICE-PRESIDENT

***Collins L. Carter**
Albion Malleable Iron Co., Albion, Mich.

National directors

Terms expire 1953

J. J. McFadyen
Galt Malleable Iron Co., Galt, Ont.
J. O. Ostergren
Lakey Foundry & Machine Co., Muskegon
***Walter L. Seelbach**
Superior Foundry, Inc., Cleveland
***Frank W. Shipley**
Caterpillar Tractor Co., Peoria, Ill.
***James Thomson**
Continental Fdy. & Machine Co., East Chicago
E. C. Troy
Palmyra, N. Y.

* *Member Executive Committee*

A·F·S officers

Terms expire 1954

Harry W. Dietert
Harry W. Dietert Co., Detroit
A. L. Hunt
American Brake Shoe Co., St. Louis
James T. MacKenzie
American Cast Iron Pipe Co., Birmingham
Martin J. O'Brien, Jr.
Symington-Gould Corp., Depew, N. Y.
A. M. Ondreyco
General Metals Corp., Oakland, Calif.

Terms expire 1955

Martin A. Fladoes
Sivyer Steel Casting Co., Milwaukee
Walter J. Klayer
Aluminum Industries, Inc., Cincinnati
J. O. Klein
Texas Foundries, Inc., Lufkin, Texas
A. D. Matheson
French & Hecht Division, Kelsey-Hayes Wheel Co., Davenport, Iowa
H. G. Robertson
American Steel Foundries, Alliance, Ohio

A.F.S. headquarters

616 S. Michigan, Chicago

Wm. W. Maloney, *Secretary-Treasurer*
S. C. Massari, *Technical Director*
Jos. E. Foster, *Technical Assistant*
C. R. McNeill, *Technical Assistant*
A. A. Hilbron, *Convention & Exhibits*

Publications Committee

H. M. St. John, *Chairman*
Crane Co., Chicago
C. H. Lorig
Battelle Memorial Institute, Columbus, Ohio
W. D. McMillan
International Harvester Co., Chicago
H. J. Rowe
Aluminum Co. of America, Pittsburgh
F. J. Walls
International Nickel Co., Detroit

A·F·S chapter directory

BIRMINGHAM DISTRICT CHAPTER *Secretary-Treasurer,* John F. Drenning, Kerchner, Marshall & Co., 715 Brown-Marx Bldg., Birmingham 3, Ala.

BRITISH COLUMBIA CHAPTER *Secretary-Treasurer,* David E. Wiseman, 3119 Turner St., Vancouver, B.C.

CANTON DISTRICT CHAPTER *Secretary,* Lester F. Stahler, Stark Foundry Co., Box 147, Canton 5, Ohio.

CENTRAL ILLINOIS CHAPTER *Secretary-Treasurer,* John Hrvatin, 207 Harrison St., Bartonville, Ill.

CENTRAL INDIANA CHAPTER *Secretary,* James A. Barrett, National Malleable & Steel Castings Co., 546 N. Holmes Ave., Indianapolis 6, Ind.

CENTRAL MICHIGAN CHAPTER *Secretary-Treasurer,* Lachlan Currie, 343 N. Marshall Ave., Marshall, Mich.

CENTRAL NEW YORK CHAPTER *Secretary,* Joseph Gibson, 582 Riverside Drive, Johnson City, N. Y.

CENTRAL OHIO CHAPTER *Secretary,* Norman H. Keyser, Batelle Memorial Institute, 505 King Ave., Columbus, Ohio.

CHESAPEAKE CHAPTER *Secretary-Treasurer,* C. A. Robeck, Gibson & Kirk Co., Baltimore.

CHICAGO CHAPTER *Secretary,* Robert L. Doelman, Miller & Co., 332 S. Michigan Ave., Chicago, Ill.

CINCINNATI DISTRICT CHAPTER *Secretary,* Harry F. Greek, Hill & Griffith Co., 1262 State Ave., Cincinnati 4, Ohio

CORN BELT CHAPTER *Secretary,* J. C. Henderson, Omaha Steel Works, 609 S. 48th St., Omaha, Neb.

DETROIT CHAPTER *Secretary,* R. L. Orth, 103 Pallister Ave., Detroit 2.

EASTERN CANADA CHAPTER *Secretary,* Alfred H. Lewis, Dominion Engineering Works, Ltd., P.O. Box 220, Montreal, Que.

EASTERN NEW YORK CHAPTER *Secretary-Treasurer,* William C. Stevenson, Rensselaer Valve Co., Troy, N. Y.

METROPOLITAN CHAPTER *Secretary,* J. F. Bauer, Hickman, Williams & Co., 70 Pine St., New York 5.

MEXICO CITY CHAPTER *Secretary-Treasurer,* Luis Delgado-Vega, Irolo 124 Zacahuizco, Mexico 13, D.F., Mexico.

MICHIANA CHAPTER *Secretary-Treasurer,* V. C. Bruce, 1504 Lawndale Rd., Elkhart, Ind.

MO-KAN CHAPTER *Secretary,* E. C. Sooy, Kansas City Hay Press Co., 801 Woodswether Road, Kansas City 6, Mo.

NORTHEASTERN OHIO CHAPTER *Secretary,* Robert D. Walter, Foundry Products Div., Archer-Daniels-Midland Co., 2191 W. 110th St., Cleveland, Ohio.

NORTHERN CALIFORNIA CHAPTER *Secretary,* Davis Taylor, 593 Market St., San Francisco 5.

NORTHERN ILLINOIS-SOUTHERN WISCONSIN CHAPTER *Secretary,* W. H. Shinn, Gunite Foundries Corp., 302 Peoples Ave., Rockford, Illinois.

NORTHWESTERN PENNSYLVANIA CHAPTER *Secretary,* Bailey D. Herrington, 312 Euclid Ave., Erie, Pa.

ONTARIO CHAPTER *Secretary-Treasurer,* G. L. White, 82 Richmond St., Richmond Hill, Ont., Can.

OREGON CHAPTER *Secretary-Treasurer,* James T. Dorigan, 236 N. E. Holman, Portland, Ore.

PHILADELPHIA CHAPTER *Secretary-Treasurer,* W. B. Coleman, W. B. Coleman & Co., 9th and Rising Sun Ave., Philadelphia.

QUAD CITY CHAPTER *Secretary-Treasurer,* R. E. Miller, 3420 7th St., Moline, Ill.

ROCHESTER CHAPTER *Secretary-Treasurer,* Duncan Wilson, American Brake Shoe Co., 10 Mt. Read Blvd., Rochester 11.

SAGINAW VALLEY CHAPTER *Secretary,* W. W. Holden, 623 Cass Ave., Vassar, Mich.

ST. LOUIS DISTRICT CHAPTER *Secretary,* Paul E. Retzlaff, Busch-Sulzer Bros. Diesel Engine Co., Div. Nordberg Mfg. Co., 3300 S. Second St., St. Louis 8.

SOUTHERN CALIFORNIA CHAPTER *Secretary,* Charles R. Gregg, Gregg Iron Foundry, 650 Hickson St., El Monte, Calif.

TENNESSEE CHAPTER *Secretary-Treasurer,* Carl A. Fischer, Jr., 500 S. Lovell Ave., Chattanooga 4, Tenn.

TEXAS CHAPTER *Secretary,* David K. McKie, 2327 W. Azalea St., Tyler, Texas.

TIMBERLINE CHAPTER *Secretary,* E. Bryan McPherson, McPherson Corp., 1361 Broadway, Denver.

TOLEDO CHAPTER *Secretary,* R. C. Van Hellen, Unitcast Corp., 1414 E. Broadway, Toledo, Ohio.

TRI-STATE CHAPTER *Secretary,* Willis H. Mook, Bethlehem Supply Co., Tulsa, Okla.

TWIN-CITY CHAPTER *Secretary-Treasurer,* Lillian K. Polzin, Minneapolis Chamber of Commerce, 1750 Hennepin at Groveland Terrace, Minneapolis 3.

WASHINGTON CHAPTER *Secretary,* F. R. Young, E. A. Wilcox Co., 913 Arctic Bldg., Seattle, Wash.

WESTERN MICHIGAN CHAPTER *Secretary,* Donald E. Meves, West Michigan Steel Foundry Co., 1148 W. Western Ave., Muskegon, Michigan.

WESTERN NEW YORK CHAPTER *Secretary,* R. E. Walsh, 42 Eastwood Place, Buffalo, N. Y.

WISCONSIN CHAPTER *Secretary,* Robert V. Osborne, Lakeside Malleable Castings Co., Racine, Wis.

STUDENT CHAPTERS

MIT *Secretary-Treasurer,* Richard Simmons

UNIVERSITY OF ILLINOIS *Secretary,* Kemp Bunting

MICHIGAN STATE COLLEGE *Secretary-Treasurer,* Louis Bachinski

UNIVERSITY OF MINNESOTA *Secretary-Treasurer,* Gerald A. Sporre

MISSOURI SCHOOL OF MINES *Secretary,* Leland D. Beverage

OHIO STATE UNIVERSITY *Secretary-Treasurer,* Alan Jones Templeton

OREGON STATE COLLEGE *Secretary,* Don Kramer

TEXAS A & M COLLEGE *Secretary,* W. E. Johnston

UNIVERSITY OF ALABAMA *Secretary,* Richard E. Ray

NORTHWESTERN UNIVERSITY *Secretary-Treasurer,* George Friese

PENN STATE COLLEGE *Secretary,* Ronald Altobelli

UNIVERSITY OF MICHIGAN *Secretary,* A. J. Terry Brown, Jr.

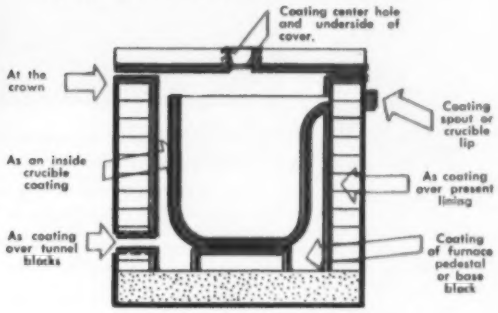
POLYTECHNIC INSTITUTE OF BROOKLYN *Secretary,* Richard Casagrande

Here's the LIFESAVER for your FURNACES, CRUCIBLES...

...and this is the Casting Method that will increase your non-ferrous metals melting production...

HY-TEMP PLASTI-BOND HIGH TEMPERATURE CEMENT REFRACTO

APPLY HTR PLASTI-BOND COATING TO THESE POINTS ON FURNACE AND CRUCIBLE


Coating center hole and underside of cover.
At the crown
Coating spout or crucible lip
As an inside crucible coating
As coating over present lining
As coating over tunnel blocks
Coating of furnace pedestal or base block

This HY-TEMP REFRACTO quick setting cement, PLASTI-BOND, offers you the refractory plus-factors that transform "down-time" hours into pounds of metal melted.

As a coating on the furnace crown, PLASTI-BOND prevents "chewing out" of lining through fusion of furnace cover and crown—as pedestal coating it prevents adherence of crucible to stool—its unusual high temperature resistance prevents heat deterioration of tunnel blocks—its quick-hardening characteristics and stamina resist abrasive wear in furnace and crucible spouts. In all non-ferrous metal-handling equipment, this HTR air setting cement protects lay-up brick and joint material by sealing such residual linings and preventing porosity, gas holes or pin holes.

Resistant to slag and other harmful oxides that adhere to ordinary linings, PLASTI-BOND protects metals in heat from contamination and analysis breakdown. Broad field experience has proven that this HTR super-refractory, plastic in substance, will prolong the heat-life of the furnace and INCREASE CRUCIBLE-LIFE 50% TO 100%!

Write today for the HTR PLASTI-BOND Application Bulletin . . . yours free of charge. Present your non-ferrous metals melting problems to HTR Service Engineers. A complete, competent analysis of your case will be furnished without obligation to you.

SPECIFY HTR FOR BEST RESULTS

HTR HY-TEMP REFRACTO MATERIALS

NATIONAL FOUNDRY SAND CO.

HI-TEMP REFRACTO MATERIALS • GRITS • BONDING CEMENTS • ELECTRIC FURNACE LININGS AND BOTTOMS

EXECUTIVE OFFICES 2130 WEST GRAND BLVD DETROIT MICHIGAN

Laborer. ● ● 1952 MODEL

No matter how good a man may be with a hand shovel and wheelbarrow, his production is many times greater as a "PAYLOADER" pilot. What's more — both he and his boss are happier because they both make more money.

In hundreds of foundries "PAYLOADERS" have taken over unpleasant, laborious material-moving chores — saving time, cutting costs and increasing production. They scoop up, carry, dump, spread and stockpile all kinds of materials . . . lift, push . . . spot and unload box cars . . . handle sand, coal, coke, scrap, slag and ashes . . . remove snow and do many other cost-cutting jobs . . . release manpower for more productive work.

Every "PAYLOADER" is a complete Hough-built tractor-shovel *designed specifically for tractor-shovel work,* with multiple reverse speeds, large pneumatic tires and other features that insure fast, low-cost performance over floors or unpaved ground, up and down ramps, through congested areas. The "PAYLOADER" is sold by a world-wide Distributor organization with complete service facilities, and seven sizes are available from 12 cu. ft. to 1½ cu. yd. bucket capacity. The Frank G. Hough Co., 711 Sunnyside Ave., Libertyville, Illinois.

JOB STUDIES are available without cost or obligation. Each one is a detailed, authorized word-and-picture report of "PAYLOADER" performance in a specific plant. A request on your letterhead is all that's necessary.

SAY "HUFF"

PAYLOADER®

Some of the international guests at the Metropolitan Chapter's "Bon Voyage" party concluding the month-long round of chapter and plant visits arranged in connection with the 1952 International Foundry Congress.

chapter news

Chapters play host

Overseas visitors to the 1952 International Foundry Congress enjoyed the hospitality of a number of A.F.S. chapters as well as the 143 plants which opened their doors to Congress attendants as more than 300 prominent foundrymen from 31 nations established an all-time high in overseas attendance at the Congress. Largest groups were those on the Study Tours "Red" and "Blue" which visited plants in eastern and midwestern foundry centers on a month-long pre-arranged schedule. A.F.S. chapters and the Pittsburgh Foundrymen's Association arranged for the plants to be open to the overseas guests on the tours or traveling as individuals.

Both tours arrived in New York on April 14 and the following two days were guests of the Metropolitan Chapter, receiving a full day's briefing on American foundry practice from a series of technical speakers.

"Blue" Tour visitors went on to Buffalo, where the Western New York Chapter entertained the group with a reception and two days of visits to foundries and pattern shops. Meanwhile the "Red" Tour went to Cleveland for three days among the shops of that area. Northeastern Ohio Chapter members feted the guests with a reception at the Cleveland Athletic Club. An entire day was spent at the Cleveland Foundry of Ford Motor Co.

Going on to Chicago, the "Red" Tour spent two days in Chicagoland plants with side trips to nearby foundry centers for visitors interested in special operations.

The "Blues" went from Buffalo to Detroit where three days were allotted for plant visits in the production and jobbing shops of the area. In addition, the Detroit Chapter held a reception

Wm. J. Grede, president of Grede Foundries, Inc., Milwaukee, and president of the National Association of Manufacturers, will speak at the Wisconsin Chapter's meeting at the Hotel Schroeder, Milwaukee, October 3. His subject will be Freedom.

Foundrymen of 31 nations overseas visited the United States during the International Foundry Congress. These groups took time out from trips through Detroit-area foundries to get acquainted with Detroit foundrymen at one of their chapter meetings.

E. P. Lunken (left), vice-president of Lunkenheimer Co., Cincinnati, explains valve production and related foundry problems to one of the international study tour groups.

Philadelphia Chapter foundrymen relax at their annual golf outing July 25 at the Manufacturer's Golf & Country Club. Photo by D. E. Best, Bethlehem Steel Co.

followed by dinner and a technical meeting on casting design.

The two study groups were together over a weekend in Chicago, resuming their plant visits on Monday, April 28. "Blue" Tour stayed in Chicago three additional days while the "Red" group moved on to Cincinnati Monday evening. In Cincinnati, one day was devoted to visits to a variety of plants with a second day given over entirely to inspection of Cincinnati Milling Machine Co.

Both tours arrived in Atlantic City the morning of May 1 to spend the next seven days at the International Foundry Congress. Resuming their plant visits, the "Blue" group went to Pittsburgh for three days which included a reception by the Pittsburgh Foundrymen's Association. New York and metropolitan area foundries and pattern shops played host to the "Red" Tour for three days, then both groups convened in Washington, D. C., for sight-seeing and visits with government officials.

Back in New York, the two groups again enjoyed Metropolitan Chapter hospitality at a farewell party in the Cocoanut Grove Room of the Hotel Park Sheraton. With good wishes, toasts, and "Bon Voyage" still ringing in their ears, the overseas visitors sailed the following day, May 14.

St. Louis District

F. J. BOENEKER
Bronze Alloys Co.

Henry W. Meyer, General Steel Castings Corp., Granite City, Ill., was elected chairman of the chapter at its final meeting of the season. Other officers elected were Webb L. Kammerer, Midvale Mining & Mfg. Co., St. Louis, *vice-chairman;* Paul E. Retzlaff, Nordberg Mfg. Co., St. Louis, *secretary;* and Robert H. Jacoby, Key Co., St. Louis, *treasurer.*

Directors with terms expiring in 1953 are: R. L. Jones, American Steel Foundries, East St. Louis, Ill.; J. O. Shive, Sterling Steel Casting Co., East St. Louis; A. J. Messmer, Messmer Brass Co., St. Louis; E. R. Belton, Pro-

continued on page 99

Some of the study tour group which visited foundries in New York, Cleveland, Chicago, and Cincinnati at a reception held in their honor by the Northeastern Ohio Chapter at the Cleveland Athletic Club. Photos by T. W. Gallagher, Lake City Malleable Co.

Bringing Together

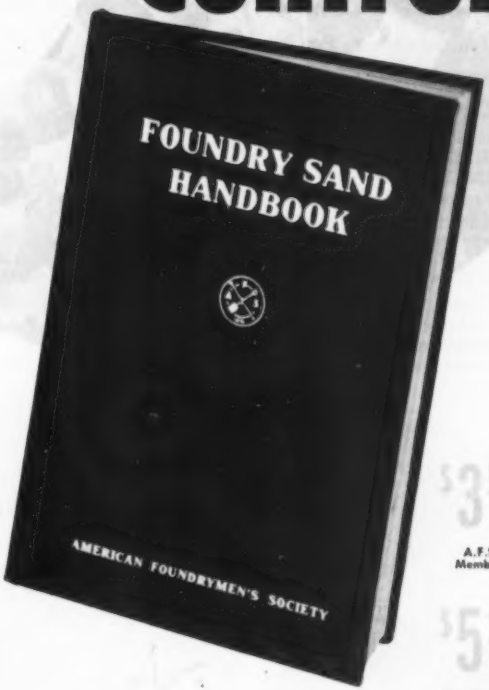
PRINCIPLES, STANDARDS, FACTS AND TABLES PERTAINING TO

SAND Control

A casting is only as good as the mold!

A foundryman may select his metal with the greatest of care. His melting procedure may be in accordance with recommended practice. And he may exercise full control over his pouring temperatures and pouring methods. BUT . . . he cannot consistently produce quality castings in molds prepared from uncontrolled sand mixtures.

That's why Sand Control is of vital importance to every foundry. That's why the FOUNDRY SAND HANDBOOK, completely revised, is such a tremendous help in achieving consistent sand control.



Contents include:

Methods for Sampling Foundry Sands and Clays
Preparing Foundry Sand Mixtures for Testing
Methods for Determining Fineness of Foundry Sands—Standard
Determining Moisture in Foundry Sand Mixtures—Standard
Determination of Permeability of Foundry Sands
Strength of Foundry Sand Mixtures
Method for Determination of Green Surface Hardness—Standard
Determining the Sintering Point of Sand Mixtures
Elevated Temperature Tests on Foundry Sand Mixtures
Chemical Analysis of Sand—Non-Standard Tests
Tentative Method of Testing Core Binders (Tensile Strength)
Mechanical Properties of Core Sand Mixtures
Method for Determining Strength of Core Paste—Tentative Standard
Non-Standard Tests
Interpretation of Room Temperature Sand Tests
Comments on Maintenance of Testing Equipment
Foundry Molding Sand Mixtures
Conversion Tables
Terms Used in Foundry Sand Work
Bibliography on Sand Testing and Control
Subject Index

265 pages . . . 23 separate sections . . . 93 illustrations . . . 13 tables . . . add to the completeness of this 6th edition of the cloth-bound A.F.S. FOUNDRY SAND HANDBOOK.

$3.50 A.F.S. Members

$5.25 Non-Member Price

AMERICAN FOUNDRYMEN'S SOCIETY

616 SOUTH MICHIGAN AVENUE • CHICAGO 5, ILLINOIS

Please send me promptly _____ copies of "FOUNDRY SAND HANDBOOK."

I enclose $_____ ☐ Cash ☐ Money Order ☐ Check to cover.

Name

Company

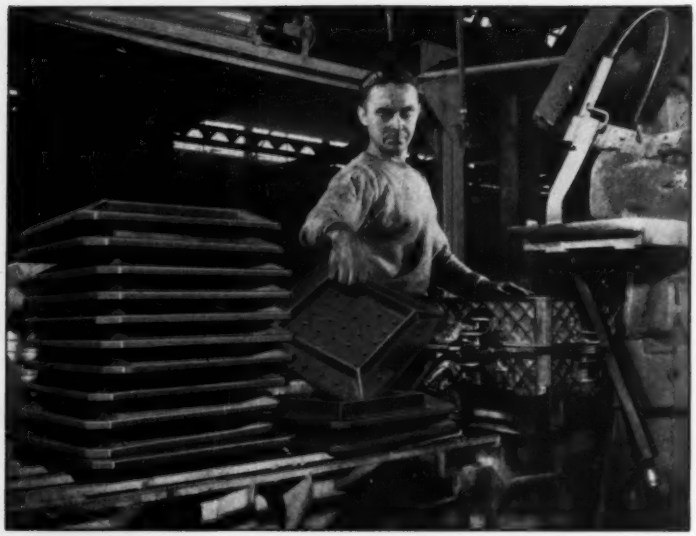
Address

City P. O. Zone State

Postage paid by A.F.S. when remittance accompanies order.

"Burning and Breakage loss not a factor since using EDCO Dowmetal BOTTOM BOARDS"

...says Olney Foundry, LINK-BELT COMPANY, Philadelphia, Pa.



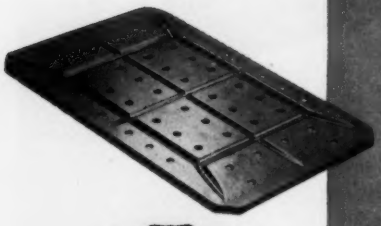
Modern mechanized foundries, like Olney Foundry, rely on the durability of EDCO DOWMETAL Bottom Boards. Even after 3 years of constant use, the EDCO DOWMETAL Bottom Boards at Olney Foundry continue to give maximum production efficiency. That's why Olney Foundry says with confidence: "Burning and breakage loss not a factor since using EDCO DOWMETAL Bottom Boards".

EDCO DOWMETAL Bottom Boards also help produce castings that are true to pattern. The exclusive grooved and vented design permits escape of gasses, and insures mold stability. Causes for rejects are kept to a minimum.

"EDCO DOWMETAL Bottom Boards are now permanent equipment in our foundry", adds Olney Foundry. "They help increase output while cutting production costs, and have more than paid for themselves in savings alone effected by substantially reduced replacement costs."

Regardless of the size of your foundry operation, your molders will like handling these boards because they are strong—yet light in weight, easy to stack, and do not splinter. EDCO DOWMETAL Bottom Boards will not warp or rot—there are no nails to come out, nothing to break or split—no upkeep.

Write us, or phone CApitol 7-2060 for price schedule and list of 74 standard sizes available from stock.



Olney Foundry was established in 1920 as a division of Link-Belt Company in Philadelphia, Pa. Olney Foundry produces grey iron castings of every description ranging in size from a few ounces to ten tons in weight. EDCO DOWMETAL Bottom Boards have been extremely helpful in maintaining the high degree of modern mechanization characteristic of Olney Foundry.

The illustrations at right show some of the foundry production equipment used by Olney Foundry to achieve their high degree of modern mechanization. The pallet-type gravity conveyor in the top panel shows molds on EDCO DOWMETAL Bottom Boards being moved to the pouring area. This pouring area is shown in the lower panel. The molds are automatically dumped after pouring and the EDCO DOWMETAL Bottom Boards are returned by the conveyor to the molder.

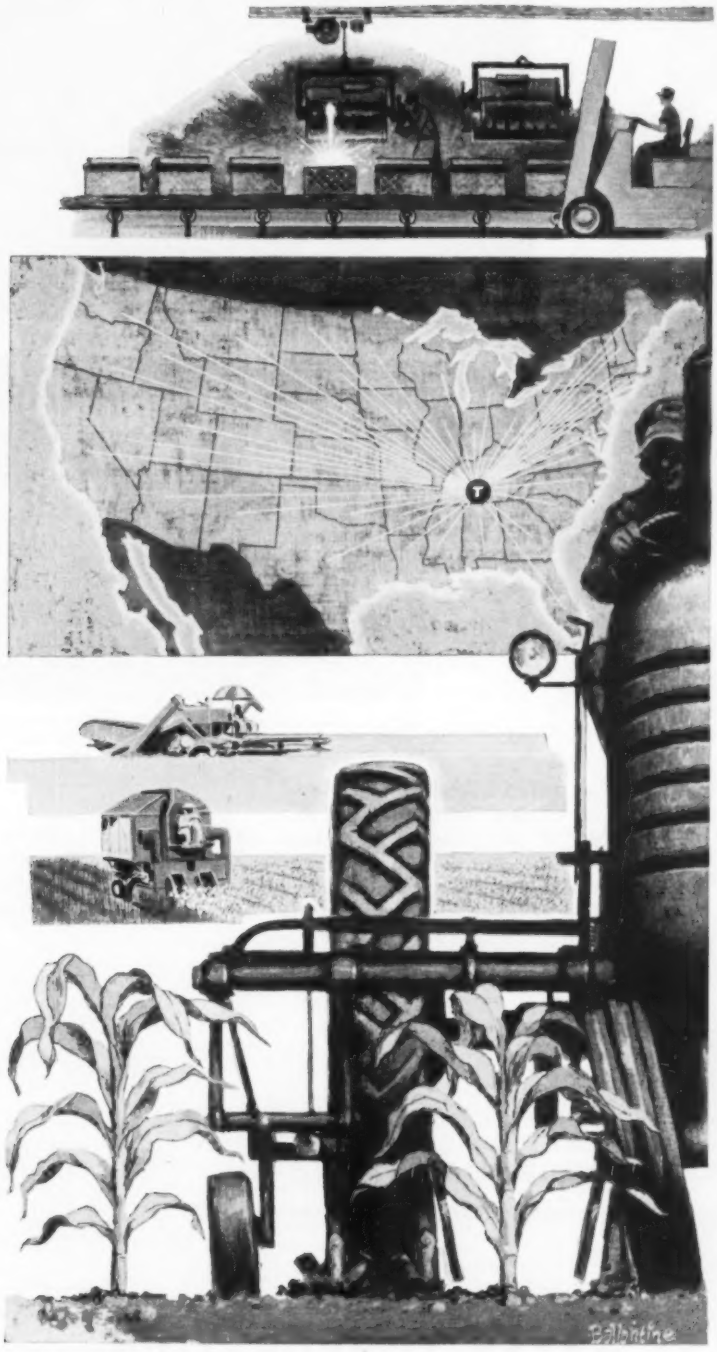
EDCO CHRISTIANSEN CORPORATION

CHRISTIANSEN CORPORATION

1521 N. KILPATRICK AVE. • CHICAGO 51, ILLINOIS

ALUMINUM ALLOY INGOTS • ZINC BASE DIE CASTING ALLOYS

THERE'S A TOUCH OF TENNESSEE IN ILLINOIS FARM MACHINERY



In the cotton fields of the South, in the corn fields of the Middle West, in the wheat fields of the Great Plains and the Great Northwest, in agricultural operations the world over, Farm Machinery from Illinois is used.

TENNESSEE supplies ferro alloys and pig iron for the steel and castings that build these machines, solvents for the paints and lacquers that protect them as well as many other chemical and metallurgical materials that help make Illinois Farm Machinery.

Manufacturers across the nation shipping their finished products around the world look to TENNESSEE for many items essential to their production. That's why TENNESSEE is known from Coast to Coast as an industry serving all industry.

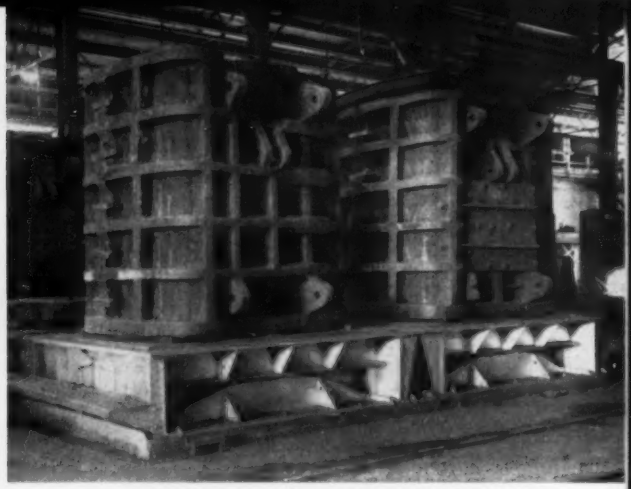
TENNESSEE
PRODUCTS & CHEMICAL
Corporation
NASHVILLE, TENNESSEE

Producers of: FUELS • METALLURGICAL PRODUCTS • TENSULATE BUILDING PRODUCTS • AROMATIC CHEMICALS WOOD CHEMICALS • AGRICULTURAL CHEMICALS

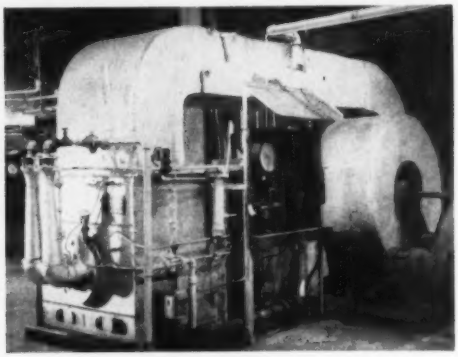
ANOTHER GREAT ACHIEVEMENT BY

CARL-MAYER!

INGOT MOLD DRYING *Equipment*



Ingot molds in place on Heating Bench, ready for drying.



One of a battery of 4,000,000 Btu gas-fired recirculating air heaters, showing burners, controls and safety devices, heat delivery fan and return ducts.

SPEEDS UP PRODUCTION AS MUCH AS 100%

A user reports doing this with equipment designed by Carl-Mayer.

This patented system eliminates costly oven casing by letting the mold be its own oven.

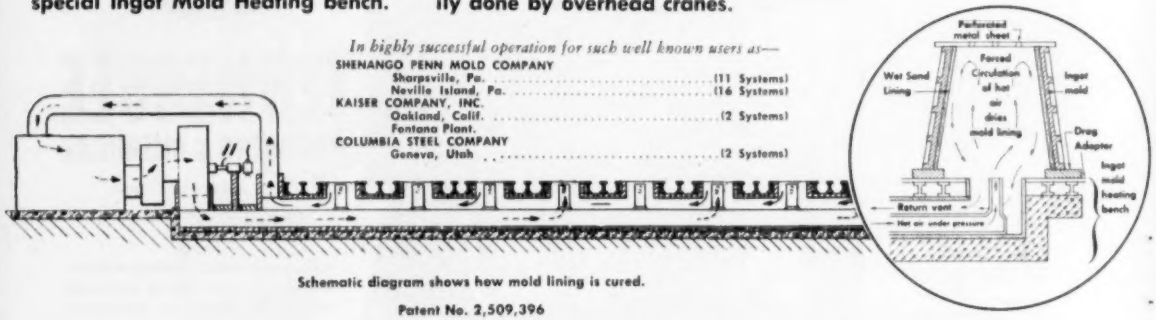
The molds, open at both ends, lined with green sand, are placed on a special Ingot Mold Heating bench.

The gas-fired heater system forces hot air through nozzles under the molds. A perforated metal plate placed on top of the mold holds in most of the heated air which bakes the lining and returns through ducts to the heating and pump unit. Placing and removing molds are readily done by overhead cranes.

Again and again Carl-Mayer Engineering has been called upon to solve unusual problems in Core Baking and Mold Drying.

In highly successful operation for such well known users as—

SHENANGO PENN MOLD COMPANY
Sharpsville, Pa. ..... (11 Systems)
Neville Island, Pa. ..... (16 Systems)
KAISER COMPANY, INC.
Oakland, Calif. ..... (2 Systems)
Fontana Plant.
COLUMBIA STEEL COMPANY
Geneva, Utah ..... (2 Systems)



Schematic diagram shows how mold lining is cured.

Patent No. 2,509,396

THE CARL-MAYER CORPORATION

3030 Euclid Avenue • Cleveland, Ohio

CORE AND MOLD OVENS, also other types of Industrial Ovens and Furnaces
Over Thirty Years' Experience

european tours

continued from page 71

Congress hotel. All events during the Congress will be arranged by the French Foundry Association. There will be opportunity to visit Versailles, Fontainebleau, and other points. It is hoped that a 3-day trip through the Chateau country, with an over night visit in ancient Tours, can be arranged.

The post-Congress Tour "Green" will arrive at LeHavre or Cherbourg, and go from there to Paris for the International Congress events. Leaving Paris, the tour will stop at Nice, then travel along the fabulous French Riviera to Genoa, and will spend several days each at Florence, Rome, Venice and the industrial center of Milan. Here plant visits will be arranged through the Italian Foundry and Metallurgical association. A two-day excursion to Naples and Capri will be possible if general interest in such a trip is expressed.

In Switzerland the tour will visit Interlaken, motor over the mountains to Lucerne, thence to Zurich and Schaffhausen. The German tour will include Wiesbaden, down the Rhine to Coblenz, then to Cologne and a motor trip thru the heart of the Ruhr-Essen-Dusseldorf industrial district. In Belgium the tour will be much the same as on the pre-Congress tour, thence to England before the journey home.

From time to time forthcoming issues of AMERICAN FOUNDRYMAN will present more detailed information concerning the various countries to be visited. Requests for any specific information regarding tour routes, stopover points, accommodations, and the like should be directed to A.F.S. headquarters.

Nearly 100 inquiries have already been received since the original announcement of the "Paris in '53" tours in the July AMERICAN FOUNDRYMAN. Steamship sailing dates will soon be available, at which time A.F.S. must make a definite original commitment for those planning to go. It is important, therefore, that all who are interested notify A.F.S. promptly so that reservations can be arranged. European travel today, by steamship or air, requires that reservations be made nine months to a year in advance.

All interested should register at once for the "Paris in '53" tours with the A.F.S. Secretary, Wm. W. Maloney, American Foundrymen's Society, 616 S. Michigan Ave., Chicago.

do you have

porosity neurosis?

Worried by leaking castings? Do you feel like this harrassed character . . . material losses, wasted machine time, lowered production and billing piling up on you?

Take the ***proven*** **POLYPLASTEX** cure

. . . reclaim rejects

. . . impregnate microporous castings

the POLYPLASTEX way . . .

POLYPLASTEX Sealants, Methods and Service combine to correct microporosity in all metals — ferrous and non-ferrous. . . .

FIRST 100% SOLIDS SEALANT No evaporation losses — Highest degree of sealing efficiency insured.

PHYSICAL AND CHEMICAL PROPERTIES **POLYPLASTEX** sealants withstand extremes of temperature and pressure, harsh solvents and corrosive chemicals. Approved and used by industry and military services.

METHODS **POLYPLASTEX** research and experience insure economical and fool-proof results. Critical tolerances not affected. Process leaves no surface film or stain.

POLYPLASTEX IMPREGNATION SERVICE AVAILABLE IN KEY INDUSTRIAL CENTERS Skilled, prompt and economical, Impregnation Service conforms to all military specifications.

WRITE FOR FREE LITERATURE TODAY

POLYPLASTEX INTERNATIONAL, INC.

441 MADISON AVE., NEW YORK 22, N.Y.

LICENSEES THROUGHOUT THE WORLD

A POLYPLASTEX Castings Clinic is nearby. If you need immediate service or consultation, fill in coupon and mail today.

NAME _____ TITLE _____

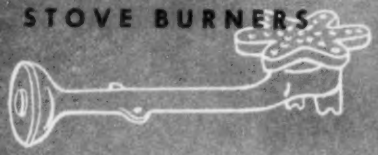
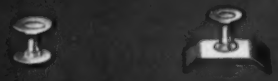
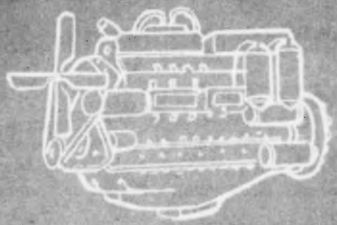
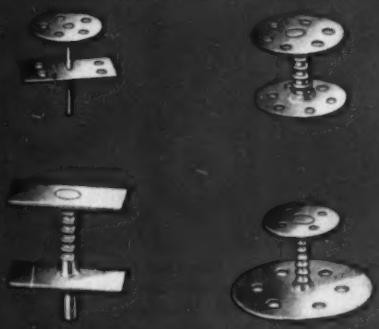
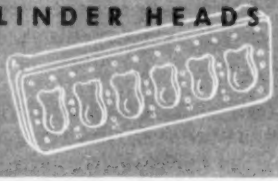
COMPANY _____

ADDRESS _____

CITY _____ STATE _____

FANNER MOTOR CHAPLETS

THE BEST CHAPLET FOR CASTINGS UP TO 1" METAL THICKNESS

Type of Application	Type of Chaplet Used
STOVE BURNERS 	
RADIATOR SECTIONS	
GASOLINE OR DIESEL ENGINES 	
PUMP CASTINGS	
CYLINDER HEADS 	

Fanner Motor Chaplets are available either tin or copper coated. Order today.

FANNER MFG. CO., CLEVELAND 9, OHIO

In Canada: CANADIAN FANNER, LTD., Hamilton, Ont., Canada

foundrymen

continued from page 28

Shoe in 1945 as an apprentice after graduation from St. Georges School and Yale University. Mr. Wood, a past chairman of the Metropolitan Chapter of A.F.S., joined the Brake Shoe & Castings Div. as assistant metallurgist in 1939. He was, successively, superintendent of the Mahwah, N. J., foundry, district works manager, and chief metallurgist. He is a Lehigh University graduate. Mr. Frick graduated from the University of Pennsylvania, joining Brake Shoe in 1942 as an apprentice, and subsequently becoming foundry foreman of the Buffalo plant, superintendent of the North Kansas City plant, and district works manager.

J. E. Rehder, foundry engineer with the Canadian Department of Mines & Technical Surveys, Ottawa, Ont., has become director of technology and research for Canada Iron Foundries Ltd., Montreal,

J. E. Rehder

Que. He will have charge of technical phases of operation of 11 foundries along with some subsidiaries, setting up a new organization to handle the work. A tireless research worker and popular speaker and writer on foundry topics, Mr. Rehder has frequently reported his findings in AMERICAN FOUNDRYMAN and at A.F.S. Conventions. Prior to joining the Department of Mines & Technical Surveys, he was with Walker Metal Products, Windsor, Ont., Bowmanville Foundry Co., Bowmanville, Ont., and Grinell Co. of Canada, Toronto, Ont.

Byron G. MacNabb has joined the research and development staff of Alloy Engineering & Casting Co., Champaign, Ill., as associate director. He will be primarily concerned with coordination of Armed Services research and development projects. For the past two years he has been assistant to the director of research, Pullman Standard Car Mfg. Co., Hammond, Ind. Previous positions include assistant to the director of research, Atomic Weapons Development Laboratory, Albuquerque, N. M. During World War II, Mr. MacNabb was a lieutenant commander associated with guided missile programs and naval ordnance. Prior to entering the Navy he was in the blast furnace department of Carnegie-Illinois Steel Co. in South Chicago.

Maurice J. Day, metallurgical engineer at U. S. Steel Co., Pittsburgh, has been named manager of the materials and processes division, Armour Research Foundation, Chicago. He succeeds W. A. Casler, acting manager of the division since May 1951, who continues as assistant director of research and manager of program development. Mr. Day joined U. S. Steel in 1937 after receiving his Ph.D. in physical chemistry from Michigan State College.

Ghulam D. Azizi, Kabul, Afghanistan, is doing research work in cast iron at University of Alabama from which he will receive a master's degree in metallurgical engineering in February 1953.

John Deaderick has been appointed manager of the Philadelphia office of Foxboro Co., Foxboro, Mass. Office address is 1621 Chestnut St., Philadelphia.

OUT OF THIS WORLD FOR WEAR!

PARACOAT

Pattern Finish

LASTS LONGER...DRAWS CLEANER...SAVES TIME

- Maintains its hard, smooth, tough, wear-resistant surface under all foundry conditions. Patterns draw clean with no damage to molds.
- Resists sand wear because of its rubber content. Users report 10 to 50 times the life of shellac and other finishes.
- Does not become sticky or tacky even when hot damp molding sand is rammed around Paracoated patterns.
- Finger dries in about 15 minutes —2 coats in 30 minutes.
- Requires no change in regular practice. Easily applied by brush, spraygun, or dipping.
- Can be applied to new, old, or repaired wood patterns. Does not raise the grain.
- Eliminates warping of patterns by preventing absorption or loss of moisture.
- Allows patterns to be stored in open sheds without danger of mildew, mold, or warping.

WHAT PARACOAT IS

Paracoat is a unique pattern coating containing rubber and other special modern chemicals carefully compounded in fast-drying solvent known as Parasolv. Represents many years of practical experience, research, and effort to build the ideal pattern coating.

WHAT PARACOAT DOES

Paracoat gives an ideal protective coating to wood, plaster, and metal patterns and core boxes. Because of its unusual characteristics, it is used for many other purposes in pattern, model, and woodworking shops. Taking the place of ordinary varnishes, lacquers and paints, it gives added protection from moisture, acids, alkalis, corrosive gases, etc.

WHY PARACOAT IS USED BY THOUSANDS

Paracoat gives better results at less cost. Thousands of wood and metal shops here and abroad increase their profits with Paracoat.

WRITE DEPT. A3 FOR LITERATURE

Also ask about PARASPRAY, the modern core and mold surface conditioner, and BONISPRAY, the permanent mold and die dressing.

Para Products Have A Place in Every Foundry

FOUNDRY RUBBER

4914 Bethesda Ave., Bethesda, Maryland
Phone: OLiver 1022

2-WAY PROTECTION FOR MAGNESIUM FIRES

PREVENT FIRES IN POURING AND HEAT-TREATING OF MAGNESIUM . .

. . . INSTALL AN

ANSUL

POSITIVE CONTROL

SO_2 SYSTEM

The danger of fire is a constant threat in pouring and heat treating of magnesium. . . . you can reduce this ever present danger by installing:

1. **An Ansul SO_2 System for mold flushing immediately before pouring, and**
2. **An Ansul manually controlled SO_2 system to maintain positive control of a protective atmosphere in your heat treating ovens.**

The use of Ansul SO_2 Systems reduces the fire hazard by preventing oxidation, reaction and ignition of magnesium and its alloys during pouring and heat treating operations.

Ask for your copy of bulletin No. A 940. In addition you can also obtain the services of one of Ansul's Chemical Engineers without cost or obligation. He will gladly cooperate with you in developing systems for your foundry.

EXTINGUISH FIRES IN THE CLEANING & MACHINING OF MAGNESIUM CASTINGS

MODEL MX 30-A

USE

ANSUL MET-L-X

DRY POWDER

FIRE EXTINGUISHERS

Ansul Met-L-X Dry Powder Extinguishers are designed to allow safe application of a special extinguishing compound for burning metal fires.

Ansul Met-L-X Dry Powder is particularly effective when applied to magnesium turnings, chips and castings.

Get the facts. Write for File No. 695. You will receive complete information and other valuable data.

ANSUL

CHEMICAL COMPANY

MARINETTE • WISCONSIN

MANUFACTURERS OF INDUSTRIAL CHEMICALS • DRY CHEMICAL FIRE EXTINGUISHING EQUIPMENT • REFRIGERANTS AND REFRIGERATION PRODUCTS
DISTRIBUTORS IN ALL PRINCIPAL CITIES IN THE U.S.A., CANADA AND OTHER COUNTRIES

board meeting

continued from page 55

Recommendations of a Technical Policy Committee were referred back to committee for development and presentation for approval at the next meeting of the Board. Vice-President Carter, as Chairman of the Chapter Contacts Committee, posted assignments for the Directors to visit all Chapters of A.F.S. during the coming year.

In addition, Director Klein repeated an invitation from the Texas Chapter for holding the 1955 non-exhibit Convention of A.F.S. in Houston, the invitation being deferred for later action by the Board in conjunction with a complete review of existing invitations from other locations.

All but four members of both Boards of Directors attended the Annual Meetings and were present for the dinner for outgoing members of the Board, held the evening of July 28.

▶ *Publish clay characteristics in British Steel Founders' report*

Principal characteristics, including bonding properties, of 39 clays from various world sources are reported in the British Steel Founders' Association's publication *The Properties of Bonding Clays*. Designated Research and Development Report No. 16/51/MM, the book is the result of five years' research at Sheffield University. Data on each clay includes chemical analysis, thermal analysis, microscopic examination, swelling properties, base exchange capacity, pH, fusion point, and green and dry strength at three and 10 rams over a range of moisture.

The Properties of Bonding Clays can be obtained for 10 shillings from British Steel Founders' Association, 13 Broomgrove Rd., Sheffield 10, England.

▶ *Fire control, magnesium handling and processing*

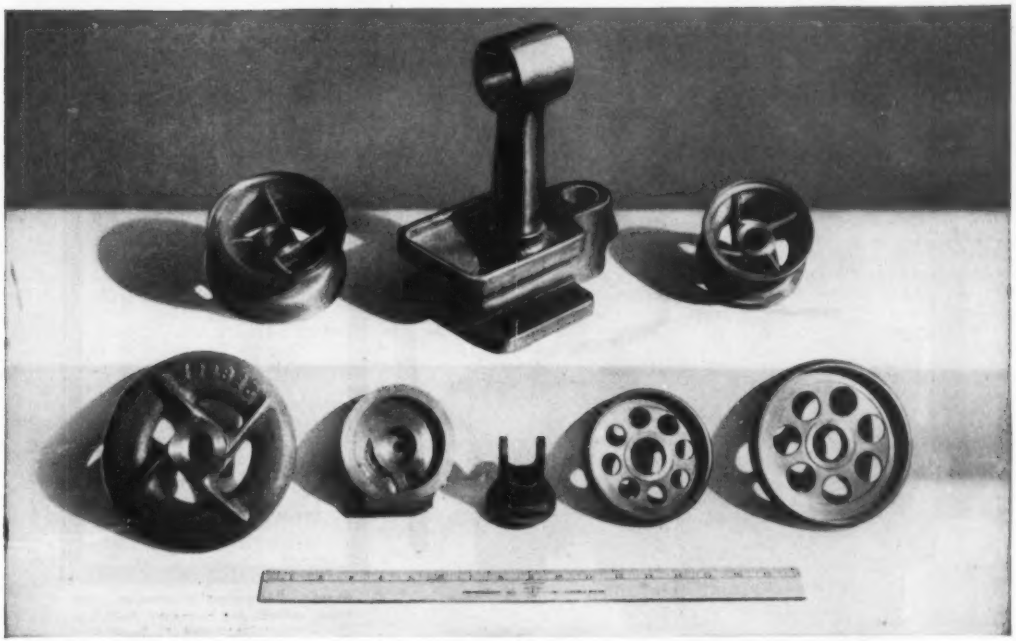
■ How to control magnesium fires is described in a 16-page pamphlet *"Standards for Magnesium."* General purpose of the booklet is to call attention to the fire and explosion hazards in storage, handling, and processing of magnesium, and how to control them. Sections cover storage, melting and casting, rough finishing, heat treating, storage of castings, handling and disposal of scrap, grinding and other metal removing operations, handling of magnesium fires, and others.

"Standards for Magnesium" is available at 25¢ from National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.

NISILOY*

to eliminate hard chilled areas in gray iron castings

. . . REDUCE machining time, tool wear, rejections



Produce *machinable* gray iron castings regardless of sharp variations in section thickness . . .

Eliminate localized hard areas or chilled (white) edges and surfaces . . .

Reduce machining time, tool wear and rejections . . . *raise both quality and quantity of your output by controlling gray iron structure with small ladle additions of NISILOY.*

Designed specifically to promote better machinability, NISILOY is a powerful innoculant and graphitizer containing about 60% Nickel, 30% silicon, balance essentially iron.

Mail the coupon now . . . for your *free* copy of a booklet that describes how Nisiloy helps you improve structure and machinability of gray iron castings.

*Trade Mark of The International Nickel Company, Inc.

EMBLEM OF INCO SERVICE
TRADE MARK

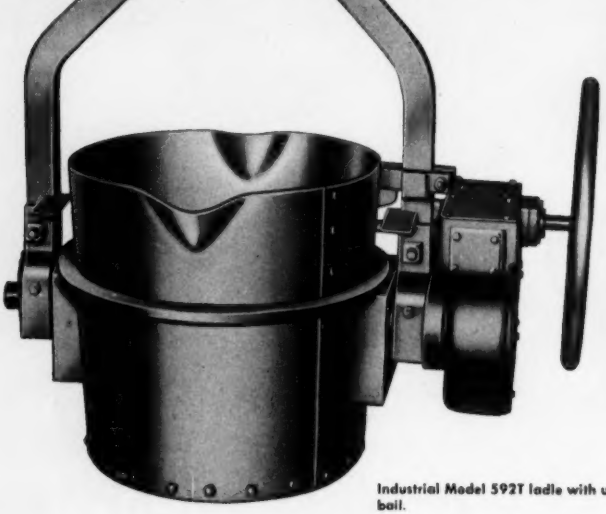
THE INTERNATIONAL NICKEL COMPANY, INC.
Dept. 20, 67 Wall Street, New York 5, N. Y.

Please send me your booklet entitled,
"NISILOY" for GRAY IRON CASTINGS.

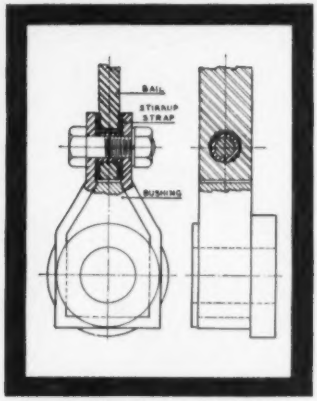
Name.....*Title*.....
Company.....
Address.....
City.....*State*.....

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

IT'S TRUE... Binding due to heat distortion COMPLETELY ELIMINATED in this revolutionary Universal Bail Design



Industrial Model 592T ladle with universal bail.



More flexibility than a universal joint. Ample vertical and horizontal flexibility. Misalignment taken care of by rotating swivel action.

Here is one of the really fundamental advances in geared ladle design. Binding problems caused by the steady rise in pouring temperatures have been solved . . . with no sacrifice in strength, safety, or simplicity.

You get four distinct advantages with this new universal bail by Industrial Equipment:

1. Binding due to heat distortion is eliminated.
2. Binding due to misalignment is eliminated.
3. Gear wear due to binding is eliminated.
4. No lubricatior or adjustment is ever needed.

This new bail is the result of a project on which Industrial Equipment has been working for over four years. Many novel and ingenious designs were proposed and discarded before the final design was accepted. Like all good things it is simple. Yet notice that in addition to simplicity it is rugged, safe, and dependable.

You should also know that this new bail has been thoroughly foundry tested. We emphasize this because the more severe the conditions, the more evident was its design superiority. Operators, for example, say they have never operated a ladle that was easier to handle *regardless of conditions.*

Look to Industrial Equipment for the really basic improvements in foundry pouring and handling equipment. *Write, wire, or telephone today for full details.*

Do you have our revised catalog No. 35?

Industrial EQUIPMENT CO.

115 N. OHIO ST., MINSTER, OHIO

LADLES • BOWLS • SHANKS • BAILS • TONGS • SPECIAL EQUIPMENT

abstracts

Abstracts below have been prepared by Research Information Service of The John Crerar Library, 86 East Randolph Street, Chicago 1, Ill. For photoduplication of any of the articles abstracted below, write to Photoduplication Service at the above address, identifying articles fully, and enclosing check for prepayment. Each article of ten pages or fraction thereof is $1.40, including postage. Articles over ten pages are an additional $1.40 for each ten pages. A substantial saving is offered by purchase of coupons in advance. For a brochure describing Crerar's library research service, write to Research Information Service.

Investment castings

A220 . . "Experiences with the Investment Casting Process," D. F. B. Tedds, *Foundry Trade Journal*, Vol 92, No. 1855, March 20, 1952, pp. 297-310.

Development of methods for producing jet aircraft parts such as burner stems, entry ducts, flame tubes, and other castings is described. Entry duct is 30 in. in diameter, with a wall thickness of 0.080 in., and finished weight of 53 lb. Its production required assembly of eight wax pipe sections to form the pattern. Second half of the paper outlines basic production problems related to injection dies, production of wax patterns, investing, drying and firing, casting, and inspection and control.

Melting borings and turnings

A221 . . "Swarf Melting in the Cupola *Foundry Trade Journal*, Vol. 92, No. 1855, March 20, 1952, pp. 313-314.

Two methods of melting machine shop scrap in the cupola are described. One is the melting of the borings and turnings as they come from the shop, which results in a high melting loss. The other is briquetting with cement. In direct melting, blast was reduced at the end of the heat to just keep coke bed incandescent and swarf was charged a few shovelfuls at a time. Operating data given shows a recovery of 84.3 per cent based on a total of 3800 lb metal charged in 15 heats.

In the briquet method, nine parts of swarf were mechanically mixed with one part of cement and poured into rough slabs. Broken into convenient size, the slabs were charged at the end of the heat but full blast was maintained. Cost figures cited show that the first method was cheaper even though the melting loss was 15 per cent instead of the 3.6 per cent experienced with the second method.

Air pollution

A222 . . "Dust Control and Fans in the Foundry", R. F. Bourne, *Engineer and Foundryman*, Vol. 16, No. 8, December 1951, pp. 69-71.

Dust in the atmosphere is harmful, and from a psychological standpoint dirty working conditions usually lead to inefficiency. Isolation of dust-producing operations is for the most part impractical. The most convenient method of ridding dust is by air movement. In order that dust particles may be moved, the air must travel at a certain minimum velocity, known as the carrying velocity. This paper discusses the factors and equipment of importance in ridding a foundry of dust.

Centrifugal casting

A223 . . "Centrifugal Castings", H. Jungbluth, *Gjuteriet*, Vol. 42, January 1952, pp. 1-10. (in Swedish)

A general outline is presented of the theoretical bases, history, and the present state of the centrifugal casting techniques and of the various phenomena involved, such as the segregation of components, etc. Manufacturing of cast-iron, steel, and non-ferrous products by centrifugal casting methods is discussed: the casting of pipes in vertical and horizontal, iron and sand-lined, molds; problems of cylinder-lining casting and hardening; manufacturing of automobile brake linings; special technical aspects and problems involved in centrifugal steel casting; manufacturing of non-ferrous pipes, bearings, etc.; and procedures that can be called semi-centrifugal, as those used in the fabrication of some automobile fans.

Machining gray iron

A224 . . "How Structure Influences the Machinability of thin Gray Iron Castings," E. A. Loria, *Materials and Methods*, Vol. 35, February 1952, pp. 99-100.

Castings are usually designed to require only light machining to finish to specified dimensions. Therefore, the cutting tool removes only the as-cast surface plus a shallow cut into the underlying metal. Practical tests have shown that innoculating cast iron with silicon carbide improves surface machinability of thin sections by elimination of free ferrite.

Shell molding

A225 . . "An Appraisal of the Shell Molding Process," H. J. Roast, *Metal Progress*, Vol. 61, April 1952, pp. 71-74.

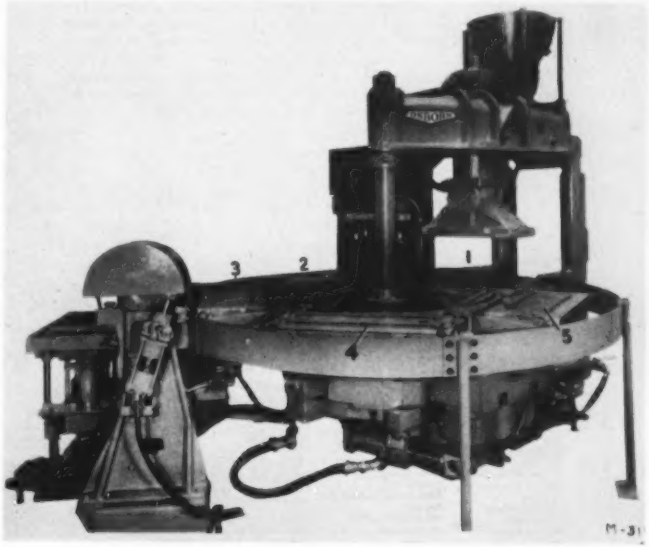
Tolerances of shell molding compare favorably with the lost wax process and plaster molding. Castings up to fifty pounds may be produced economically. Alloys best suited for this operation

▶ *Makes six cores a minute*

■ Production of automotive cores has been increased more than 600 per cent by a new machine which combines several core-making operations.

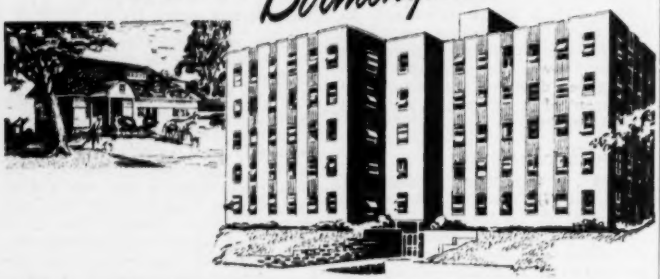
The machine consists of a turntable with five stations: (1) for the core blower; (2) where the worker places dryer plate on the finished core; (3) roll-over draw where core is taken from box and placed on conveyor; (4) space for preparing another core box; and (5) place where preparation of box is completed.

This rotating combination of operations saves considerable space and time in the core room. It is reported that the machine is capable of producing six cores per minute (instead of one per minute as previously reported in AMERICAN FOUNDRYMAN).



SOUTHERN RESEARCH INSTITUTE

Located in *Birmingham*



Expands From a Carriage House to a Square City Block in Only Seven Years

SEVEN years ago, Southern Research Institute was opened in a converted home and carriage house a few blocks from the heart of downtown Birmingham—the South's industrial capital and distribution center. Sparked by the dynamic development of the Southern region, Southern Research Institute has grown to be one of the Nation's important nonprofit research organizations. Its staff is composed of highly trained and skilled scientists. In five large modernly equipped laboratories new products and new processes are created and old products and processes are tested and improved.

During its short life Southern Research Institute has handled many research projects for the Nation's biggest industrial concerns as well as for large numbers of smaller industries. Besides working for industry in more than fifteen different fields of technology, it has carried on vital programs for the Department of Defense and Atomic Energy Commission. It has won international recognition for achievements in cancer and virus chemotherapy.

Founding of the Southern Research Institute realized the vision of a small group of progressive Southern business leaders, headed by Thomas W. Martin, Chairman of the Board of Alabama Power Company and Chairman of the Institute since its organization. They saw the need for technological facilities within the South to aid its industries and energize its progress. They worked with tireless effort until their goal was reached.

★ ★ ★ ★ ★ ★

When you place your plant in the Birmingham district, you will have at your doorstep the broad services of this great Research Institute. Even though you do not have a plant in this area, the facilities of this institution are available to you. For further information, we invite you to write this Committee.

BIRMINGHAM COMMITTEE OF 100

1914 Sixth Ave., N., Birmingham, Ala.

Executive Committee

Gordon Persons
Governor
State of Alabama

Bradford C. Colcord
President
Woodward Iron Co.

John S. Coleman
President
Birmingham Trust
National Bank

Donald Comer
Chairman of the
Executive Committee
Avondale Mills

William P. Engel
President
Engel Companies

W. W. French, Jr.
President
Moore-Handley
Hardware Co.

Clarence B. Hanson, Jr.
Publisher
The Birmingham News

W. H. Hoover
President
Employers Insurance
Co. of Alabama

Claude S. Lawson
President
United States
Pipe & Foundry Co.

Thomas W. Martin
Chairman of the Board
Alabama Power Co.

Fred Osborne
President
Sloss-Sheffield
Steel & Iron Co.

J. C. Persons
President
First National Bank

D. W. Schoenbacher
President
Loveman, Joseph &
Loeb

Marvyn H. Stone
Stone, Ages & Leach

A. V. Wiebel
President
Tennessee Coal & Iron Div.
United States Steel Co.

seem to be the cast irons and the light metal alloys. The future of shell molding seems to be associated with the development of suitable automatic equipment, but fortunately, the process readily lends itself to mechanization.

Castings design

A226 . . "Design of Gray Iron Castings", T. E. Eagan, *Mechanical Engineering*, Vol. 74, No. 2, February 1952, pp. 115–117.

A casting will be no better than its design allows the foundry to make it. A designer who is cognizant of the best foundry techniques and metal characteristics will design his casting much more intelligently. Consultation between designer and foundryman during development is recommended so that the properties of the metal may be utilized.

Cerium determinations

A227 . . "Rapid Analysis Determines Cerium in Steel", C. M. Johnson, *Iron Age*, Vol. 169, No. 3, January 17, 1952, pp. 94-96.

A rapid method of determining the cerium group rare earth content in steels where they are used as additive agents has been developed. The determination involves precipitation with dry sodium peroxide powder from the still free acid sulfate solution. The cerium group metals, which include lanthanum and neodymium, are co-precipitated.

Tempering nodular iron

A228 . . "Quench-temper Treatment Improves Nodular Irons", J. E. Rehder, *Iron Age*, Vol. 169, No. 3, January 17, 1952, pp. 89–93.

To obtain maximum as-quenched hardness and fully martensitic structure, it is essential that nodular iron be heated to a temperature above the top of the critical range. This range is determined by the alloy content. After a suitable holding time to redissolve carbides and ferrite, the iron is quenched from the top of the temperature range in order to decrease stresses and control matrix carbon content. Tempering is more rapid than for steels due to the precipitation of secondary graphite.

Raw material control

A229 . . "Control of Foundry Raw Materials", F. Roll, *Giesserei*, Vol. 39, February 7, 1952, pp. 49-54. (in German)

It is suggested that foundries organize the inspection and the control of quality, storage, and proper use of raw materials on a more rational basis. Only the closest observation of the relationship between the totality of the materials' characteristics and the properties of the manufactured product, as well as the adoption of rational sampling and testing methods, can guarantee success in modern foundry work. This is illustrated in a survey of the numerous materials involved in this industry.

USCO

35000 LBS. TENSILE STRENGTH ...WITHOUT HEAT TREATMENT!

USCO T is the high-tensile aluminum alloy that gives you physical properties usually obtainable only by heat treating —without this delay and costly extra step.

USCO T can be cast in both sand and permanent mold. Typical properties in sand after two weeks natural aging are 35000 T. S., 25000 Y. S., 5% elongation and 74 Brinell. The elimination of heat treating minimizes warpage problems.

USCO T is available now for prompt shipment. For further information on this exceptional time and money saving aluminum alloy contact your USCO representative now or write us direct.

FREE —Send for your USCO Aluminum Alloy Selector. A handy guide to analysis, specifications and many other foundry problems.

For 48 years, pioneers in aluminum development.

USCO **U. S. REDUCTION CO.**
East Chicago, Indiana

PLANTS: EAST CHICAGO, INDIANA • TOLEDO, OHIO

American Foundrymen's Society introduces

New Company Members

Foundry Supply Co., Inc. Robbinsdale, Minn.—Norman E. Wisner, Secy. & Treas. (Twin City Chapter).

Shanafelt Mfg. Co., Canton, Ohio—William E. Shanafelt, Pres., (Canton Chapter).

Birmingham District Chapter

James V. Fairley, Sales Repr., *Alabama By-Products Corp.*

John K. Travis, Pres., *John K. Travis & Co., Inc.*

Canton District Chapter

Walter J. Bennett, Sales Mgr., *Canton-Chaplet Mfg. Co.*

John Hagen, Owner, *Hagen Pattern Works*

Francis E. Hurley, Vice-Pres., *Union Wholesale Lumber Co.*

Frank Martin, Asst. Supt., *The Stark Foundry Co.*

Richard V. Moore, Salesman, *Dougherty Lumber Co.*

Robert R. Palmer, Bookkeeper, *The Stark Foundry Mfg. Co.*

William E. Shanafelt, Pres., *Shanafelt Mfg. Co.*

Herbert H. Zollar, Mgr. of Sales, *Shenango-Penn Mold Co.*

Central Illinois Chapter

John Benko, Jr., Time Study Engr., *Peoria Malleable Castings Co.*

Roscoe L. North, *Caterpillar Tractor Co.*

Central Ohio Chapter

Frederic D. Hertenstein, Sales Mgr., *M. Hertenstein Co.*

Chicago Chapter

William E. Karry, Sls. Engr., *West Michigan Steel Fdy. Co.*

Vito V. Mitkus, Prod. Coordinator, *Ind. Hbr. Wks. American Steel Fdries.*

William G. Rawson, Sales Trainee, *Whiting Corp.*

Richard H. Shurmer, Sand Tech., *Hydro-Blast Corp.*

H. B. Zeigler, Dist. Mgr., Barrett Div., *Allied Chemical & Dye Corp.*

Cincinnati Chapter

Alex Brandt, Core Rm. No. 2 Fmn., *The Oberhelman-Ritter Foundry Co.*

John Campbell, Fmn.-Mold Dept. *The Oberhelman-Ritter Foundry Co.*

Ed Chambers, Met., *The Oberhelman-Ritter Foundry Co.*

Frank Glaab, Center Floor Fmn., *The Oberhelman-Ritter Foundry Co.*

Harold Hay, Core Rm. No. 1 Fmn., *The Oberhelman-Ritter Foundry Co.*

Earl Meyer Fmn. Cleaning Rm., *The Oberhelman-Ritter Foundry Co.*

Lester C. Rauch, Sales Engr., *Denton & Anderson Co.*

Robert H. Ritter, Treas., *The Oberhelman-Ritter Foundry Co.*

Curtis W. Rose, Supt. of Quality Control, *Acme Aluminum Alloys*

Joseph H. Wanstrath, Frm.-Pattern Dept., *The Oberhelman-Ritter Foundry Co.*

Corn Belt Chapter

Russell Cannon, Core Maker, *Paxton-Mitchell*

E. B. Christensen, Secy.-Treas., *Paxton-Mitchell*

I. M. Johnsen, Supt., *Griffin Wheel Co.*

B. J. Johnston, Patternmaker, *Oehrle & Bergman Co.*

A. L. Katelman, Owner, *Katelman Foundry & Mfg. Co.*

Clyde Miller, Plant Supt., *Refinite Corp.*

Lawrence Miller, Prod. Control, *Paxton Mitchell*

P. A. Pounds, Vice-Pres., *Paxton-Mitchell*

H. F. Scott, Fdy. Fmn., *Refinite Corp.*

Jerry Willis, Prod. Expediter, *Cushman Motor Works*

Detroit Chapter

Raymond T. Daksiewicz, Jr. Sand Tech., *Harry W. Dietert Co.*

Metropolitan Chapter

Gerald W. France, Industrial Engr. Appr., *American Brake Shoe Co.*

Mexico City Chapter

Rafael Castillo, Student, *Escuela Nacional De Ciencias Quimicas*

Michiana Chapter

Donald A. Dalton, Jr., *Dalton Foundries, Inc.*

Morton H. Huffer, Partner, *Huffer Foundry Co.*

Norman D. Huffer, Partner, *Huffer Foundry Co.*

Harold Klarks, Tool Designer, *Oliver Corp.*

Richard J. Zeller, Tool Designer, *Oliver Corp.*

Northeastern Ohio Chapter

Robert D. Everett, Met. Engr., *Nat'l Malleable & Steel Castings Co.*

Northern California Chapter

W. A. Montgomery, Supt., *U. S. Pipe & Foundry Co.*

J. H. Reynolds, Chemist, *U. S. Pipe & Foundry Co.*

W. S. Thompson, Production Fmn., *U. S. Pipe & Foundry Co.*

Ontario Chapter

J. Michael Brown, Accountant, *London Concrete Machinery Co.*

John Laitar, Cupola Control, *London Concrete Machinery Co.*

William A. Richardson, Salesman, *William R. Barnes Co., Ltd.*

Oregon Chapter

Henry Anthony Pyzdrouiski, Mgr., *Bend Iron Works*

Philadelphia Chapter

John W. Swengel, Fdy. Supt., *American Chain & Cable Co., Inc.*

Quad City Chapter

Lester Ketelsen, Fdy. Supt., *Climax Engine & Pump Mfg. Co.*

Saginaw Valley Chapter

Alex Hubbard, Gen. Fmn., *Foundry Div., Eaton Mfg. Co.*

Harold P. Milster, Accountant, *Eaton Manufacturing Co.*

Southern California Chapter

C. B. Callomon, Sales Mgr. & Met., *Food Machinery Corp.*

Phillip Campbell, Owner, *Campbell Pattern Works*

Henry E. Francis, Partner, *Francis Associates*

William T. Winder, Molder, *U. S. Naval Station*

Robert T. Yoho, Sales Engr., *Ingersoll-Rand Co.*

Texas Chapter

Ira P. Dahl, Asst. Purchasing Agent, *Cameron Iron Works, Inc.*

Tri-State Chapter

Karl Langham, Jr., Salesman, *Christy Firebrick Co.*

Twin City Chapter

Edward E. Mueller, Pres., *Foundry Supply Co.*

Norman E. Wisner, Secy. & Treas., *Foundry Supply Co., Inc.*

Western Michigan Chapter

Alfred G. Custard, Fmn., *Lakey Foundry Corp.*

Wisconsin Chapter

John R. Anderes, *Belle City Malleable Iron Co.*

William E. Randquist, Tech. Engrt. Student (Foundry) *Intl. Harvester Co.*

Outside of Chapter

William J. Williams, Dir., Intl. Correspondence School, *Scranton, Pa.*

International

South Africa

Spencer James Venning, Mng. Dir., *Eclipse Engineering, Ltd. Transvall, S. Africa*

Australia

Russell N. Stokes, Chairman, *Stokes Foundries Pty., Ltd. Brunswick, Melbourne, Australia*

England

Eric Parkes, Chief Chemist, *The Fordath Engineering Co., Ltd. West Bromwich, England*

Italy

Domenico Mascio, *Rieti, Italy*

Japan

Dr. T. Fujiwara, *I. C. I. (Japan) Ltd. Tokyo, Japan*

▶ *Distribute Foundry Congress Registered Attendance List*

■ List of those who attended the 1952 International Foundry Congress in Atlantic City has been compiled and distributed to the nearly 270 exhibitors represented in the huge Foundry Show.

THER-MONIC ELECTRONIC CORE BAKERS

FIRST and FINEST in the FOUNDRY INDUSTRY!

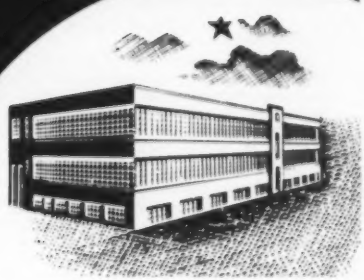
INCOMPARABLE PERFORMANCE RECORD!

The electronic core baking process . . . first introduced in 1945 by Induction Heating Corporation, largest producers of electronic heat treaters . . . has won, in a relatively short space of time, an important place for itself in the core rooms of the greatest number of those foundries which have already installed electronic core baking equipment.

Since the introduction of the first Ther-monic laboratory core baker . . . we have developed, in close collaboration with interested foundries, the type of rugged equipment best suited for the industry's particular needs. A recent survey of two thousand Ther-monic installations in all fields, revealed the amazing fact that our service division has only averaged one call in 1.6 years per unit.

Ther-monic core baking equipment is now available with hourly capacities of 500 lbs., 1000 lbs., 2000 lbs., 4000 lbs. and 8000 lbs. One of our field engineers will be glad to personally survey your core baking requirements. Write today!

SPECIFICATION SHEETS
Yours for the asking . . .
Write for new, illustrated specification sheets. Study and compare the many exclusive features incorporated therein.



INDUCTION HEATING CORPORATION

181 WYTHE AVENUE • BROOKLYN 11, NEW YORK

Largest Producers of Electronic Heat Treating Equipment

book reviews

Machining of metals

Machinability and Machining of Metals . . by Norman E. Woldman and Robert C. Gibbons, 518 pp. Illustrated with photomicrographs and diagrams. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18. $7.50. (1951).

This up-to-date analysis of metallurgical characteristics of metals and their alloys contains sections on machining and machinability of low-carbon steels, high-carbon steels, tool and die steels, stainless steels, cast irons, and aluminum, magnesium, copper, nickel and zinc base alloys.

Such new developments as theoretical considerations of machinability, machining of light metals, and machining of hard, high-temperature alloys and refractory metals and non-metallic materials such as plastics and hard rubber are covered in detail from the metallurgical standpoint and recommendations are made as to machine tools, machining operations, feeds and speeds, cutting fluids, etc.

Brass and bronze casting

Casting of Brass and Bronze . . by Daniel R. Hull. 186 pp. Illustrated with photographs. Indexed. Published by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $3.50. (1950).

Comprising practical aspects of brass and bronze casting in the United States from 1900 to 1950, this volume represents the thoughts and personal experiences of the author compiled during his long career as a non-ferrous foundryman.

Engineer's pocket data book

The Practical Engineer Pocket Book, 1951 . . 63rd Edition, edited by N. P. W. Moore. 744 pp. Published by Pitman Publishing Corp., New York, N. Y.

A vest pocket compendium of practical data, formulas, tables and brief, practical "how to do it" information on practically every phase of modern engineering. An extensive index is provided for quick on-the-job reference. Also included are German-English, French-English and Spanish-English technical dictionaries and a section on general engineering information.

Pyrometry

Modern Pyrometry . . C. H. Campbell. 155 pp. Illustrated with photographs and diagrams. Published by Chemical Publishing Co., 212 Fifth Ave., New York 10. $4.00. (1951)

Although written primarily for the metallurgist, this book should be useful to chemists, engineers, and technical workers who use high temperatures in their production work. It describes a selected group of pyrometric systems which provide a good overall picture of the techniques and equipment available for temperature measurement and control. Contents include a glossary of terms, many references to latest developments, and conversion tables.

Shrink tables

Shrink Table Sheets . . 17 pp. Published by The Arrow Pattern & Engineering Co., Box 823, Erie, Pa. $1.00 (1951)

Decimal equivalents for all dimensions from 1/64 to 12 in., compensated for material shrinkages from 1/32 in. per ft to ½ in. per ft are included in 11 by 15 in. book of shrink tables. With each equivalent corrected to 4 decimal places, these sheets provide a precision method of checking or establishing measurements which involve known shrinks in ferrous and non-ferrous metals or plastics. 768 readings are included in all.

Health in the foundry

Health of Ferrous Foundrymen in Illinois, P.H.S. Publication 31 . . 130 pp. Illustrated. Published by Federal Security Agency, Public Health Service, Washington, D. C. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 75c (1950).

Of a total of 185 ferrous foundries surveyed over a period of 12 months, 18 considered as representative were selected for this study. Contents cover environmental studies as well as medical studies, and the findings are analyzed wherever possible.

Modern grinding practice

The Grinding Wheel . . Kenneth B. Lewis. 409 pp. Illustrated by photographs and drawings. Published by The Grinding Wheel Institute and its member companies, Greendale, Mass. $3.50. (1951).

This publication has been prepared to furnish a solid grounding in the fundamentals of abrasive technology. It is definitely not a handbook of grinding practice. Five of its 28 chapters are specially important to the foundry field: Rough Grinding; Truing, Dressing, and Balancing; Disc Grinding; Cutting Off; and Factors Affecting Wheel Selection.

Cast iron microstructure

Typical Microstructure of Cast Iron . . 55 pp. Illustrated. Published by British Cast Iron Research Assn., Alvechurch, Birmingham, England. $2.10 to members of BCIRA; $2.94 to non-members. (1951).

This book is intended as a practical tool for those who estimate how far a given structure is likely to meet specified requirements. It provides a series of photomicrographs of the principal types of cast iron normally encountered by the engineer and metallurgist, at magnifications to which they are accustomed. It is provided with a technical introduction which shows the dependence of the structure and properties of cast iron on cooling rate and composition, and considers separately the mode of occurrence and appearance of the constituents. Photomicrographs, 41 in all, are printed 11¼ x 8½ in. and are accompanied by an explanatory text on the facing page. They are grouped under constituents of cast iron, unalloyed cast irons, special and alloy cast irons, and malleable cast iron. Several additional photomicrographs illustrate common defects of iron castings.

Manufacturing economics

Economics of American Manufacturing . . by Edward L. Allen. 566 pp. Illustrated with tables, charts, and pictures. Henry Holt & Co., 383 Madison Ave., New York 17, New York. $6.95. (1952).

Study of 19 industries in five general categories—basic metals, basic non-metalics, metalworking, textile and leather, and consumers' goods—is reported. Business and production statistics provide a basis for analysis which is broken down into: relative size and importance of the industry, use pattern of product, export-import relationships, relations with the federal government, ownership and control, location and capacity of plants, competitive position of plants, technology of manufacture, input and cost factors, prices and pricing policies, private investment, profits, and future outlook.

Communications handbook

Technical Reporting . . by Joseph N. Ulman, Jr. 289 pp. Illustrated by numerous examples and specimens. Henry Holt & Co., 383 Madison Ave., New York 17, N. Y. $4.75. (1952).

This practical handbook shows how to convey information and ideas accurately and efficiently, using techniques perfected by modern industry and science. The book points out that one of the commonest and most serious faults in technical writing is the burial of the important, fundamental ideas under a mass of detail. A minimum of formal rules of grammar and punctuation are used, the author preferring to cite only those expected to be remembered and applied. Subjects covered include formal reports, informal reports, laboratory reports, technical papers, and oral reports. Also included are sections on writing style, mechanics of written presentation, tables, and visual presentation. A number of specimens of written communication are included in the appendix and sprinkled profusely throughout the text.

Foundry practice

The Art and Science of Founding . . by N. L. Bush. 333 pp, 112 fig. Angus & Robertson Ltd., Sydney, Australia, and London, England.

Written as a text for trade schools, technical colleges, and as a reference for metallurgists, engineers, and foundry workers, the book is a nice combination of technical and practical in-

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

How Manganese Briquets Control Sulphur . . . Produce Cleaner, Sounder Iron Castings

The use of manganese briquets in the cupola charge provides a convenient and accurate method of controlling this important element in cast iron. Accurate control of the manganese level is essential for the consistent production of high-quality iron. While manganese will be introduced in varying amounts by the pig iron and scrap, a supplementary source—such as manganese briquets—is usually essential if accurate analysis control is to be maintained.

Manganese has two important functions in cast iron:

1. It acts as a sulphur-neutralizing element when used in small amounts — up to roughly six times the sulphur content.
2. It acts as an alloying element, imparting density and strength when present in amounts greater than necessary to perform its desulphurizing function.

Neutralizes Sulphur

Cast iron tends to run considerably higher in sulphur than was the case a decade ago because there has been an increase in the sulphur content of both scrap and foundry coke in recent years. Unless sufficient manganese is provided in the cupola mixture, this higher sulphur content will tend to produce a hard, brittle metal with deep chilling properties and poor fluidity. Castings of such metal are difficult to machine and may be the cause of many foundry troubles, including strain cracking, chilled corners and edges, and misrun castings.

Since manganese has a high affinity for sulphur, it forms manganese-sulphide inclusions when present in sufficient amounts. These inclusions are relatively harmless to the metal, and the detrimental effects of the sulphur content are thus largely eliminated. It is good practice to maintain a manganese-sulphur ratio of approximately 6:1 to insure proper neutralization of the sulphur content.

A certain proportion of the manganese-sulphide that is formed will float to the surface of the molten iron and be absorbed by the cupola slag. In this way, manganese actually eliminates a portion of the sulphur introduced by cupola melting. Thus, relatively high manganese irons will invariably run lower in sulphur than will metal melted from similar raw materials but of lower manganese content.

Sounder Castings

The cleansing effect of manganese is a decided help in producing a high-quality foundry product with a minimum amount of trouble from porosity, shrinks, and blows. Manganese helps to neutralize gassy metal that may result from temporarily unbalanced cupola conditions or poor-quality melting materials. It improves the fluidity of iron that may be a little on the cold side or high in sulphur. Manganese does a general cleansing job that is helpful in avoiding slag inclusions, which have a detrimental effect on machinability.

Alloy Effects

When manganese is used in amounts greater than that necessary to neutralize sulphur, it acts as a desirable carbide-stabilizing alloy in cast iron. Depending on the amount added and other elements present, manganese tends to refine pearlite and, at higher levels, to form martensite. Increasing the normal percentage of manganese in cast iron to 1 per cent or above will often change a normally ferritic-pearlite matrix to the stronger all-pearlitic structure.

Two Types of Briquets

ELECTROMET produces two types of manganese briquets — EM silicomanganese briquets and EM ferromanganese briquets. The silicomanganese type is square in shape and contains exactly 2 lb. of manganese and about ½ lb. of silicon. Ferromanganese briquets, which are oblong in shape, also contain exactly 2 lb. of manganese, but do not contain silicon.

The recovery of manganese from EM manganese briquets normally runs about 85 per cent, because the briquets are made with a binder that prevents oxidation until the alloy unites with the iron in the melting zone of the cupola.

A typical mixture for high-strength iron is given in the accompanying table. For further information—

The terms "EM" and "Electromet" are registered trade-marks of Union Carbide and Carbon Corporation.

Typical Cupola Charge for Producing High-Strength Iron With EM Briquets

Base Charge			Alloys in Charge Material			
			Silicon		Manganese	
%	Lb.	Material Charged	%	Lb.	%	Lb.
15.0	150	Pig Iron	2.30	3.45	0.70	1.05
40.0	400	Steel Scrap	0.10	0.40	0.45	1.80
35.0	350	Return Scrap	1.90	6.65	1.00	3.50
10.0	100	Purchase Scrap	2.00	2.00	0.45	0.45
100.0%	1,000 lb.	Total Base Charge		12.50		6.80
Briquets Required		7½ Small Silicon		7.50		—
		2½ Silicomanganese		1.25		5.00
		Total Alloys Charged		21.25 lb. Si. or 2.12% Si.		11.80 lb. Mn. or 1.18% Mn.
		Melting Recovery Factor		x .90		x .85
		Final Analysis of Iron		1.90% Si.		1.00% Mn.

SEND FOR FREE BOOKLET

Electro Metallurgical Company
Technical Service Department
30 East 42nd Street, New York 17, N. Y.

Please send me a copy of the booklet "Briquetted Alloys for the Iron Foundry Industry".

Name ..... Position .....

Company .....

Street .....

City ..... Zone .... State .....

you can rely on

NATIONAL BENTONITE

Baroid Sales Division • National Lead Company

BENTONITE SALES OFFICE: RAILWAY EXCHANGE BLDG. • CHICAGO 4, ILL.

These approved* DISTRIBUTORS *will give you quick service.

AMERICAN CYANAMID CO.
New York, New York

AMERICAN STEEL & SUPPLY CO.
332 S. Michigan Ave.
Chicago 4, Illinois

THE ASBURY GRAPHITE MILLS, INC.
Asbury, New Jersey

BARADA & PAGE, INC.
Kansas City, Missouri
(main office)
Also—(Branches)
Tulsa, Okla.
Oklahoma City, Okla.
Wichita, Kansas
Dallas, Texas
Houston, Texas
New Orleans, La.

G. W. BRYANT CORE SANDS, INC.
McConnellsville, New York

LLOYD H. CANFIELD FOUNDRY SUPPLIES
1721 Minnesota Ave.,
Kansas City, Kan.

COMBINED SUPPLY AND EQUIPMENT COMPANY
215 Chandler St.,
Buffalo 7, N. Y.

THE FOUNDRIES MATERIALS CO.
Coldwater, Mich. Also—
(Branch) Detroit, Mich.

FOUNDRY SERVICE COMPANY
North Birmingham, Alabama

INTERSTATE SUPPLY & EQUIPMENT CO.
647 West Virginia St.
Milwaukee 4, Wis.

INDEPENDENT FOUNDRY SUPPLY CO.
6463 East Canning St.
Los Angeles, California

INDUSTRIAL SUPPLY CO.
San Francisco, California

KLEIN-FARRIS CO., INC.
Boston, Massachusetts
New York—Hartford, Conn.

LAGRAND INDUSTRIAL SUPPLY CO.
Portland, Oregon

MARTHENS COMPANY
Moline, Illinois

CARL F. MILLER & CO.
Seattle, Washington

PENNSYLVANIA FOUNDRY SUPPLY & SAND CO.
Philadelphia, Pennsylvania

REFRACTORY PRODUCTS CO.
Evanston, Illinois

ROBBINS & BOHR
Chattanooga, Tennessee

SMITH-SHARPE COMPANY
Minneapolis, Minnesota

STEELMAN SALES CO.
Chicago, Illinois

STOLLER CHEMICAL CO.
227 W. Exchange Ave.
Akron, Ohio

WEHENN ABRASIVE CO.
Chicago, Illinois

WESTERN MATERIALS CO.
Chicago, Illinois

MR. WALTER A. ZEIS
Webster Groves, Missouri

formation. It appears to be admirably suited to trade school and apprentice training, but seems somewhat lacking in the technical phases of foundry engineering as it is becoming broadly recognized. This limitation is offset by the practical information contained which is often only briefly covered in the more technical texts.

The book illustrates and describes mechanization and equipment in greater detail than some texts have in recent years. Other topics include: sand and sand testing, molding (including loam molding), cores, flasks, design of castings, casting defects, elementary metallurgy, and melting equipment and ladles. A section on calculations is devoted primarily to casting weights and furnace charges.

Non-ferrous welding

The Welding of Non-ferrous Metals . . E. G. West. 553 pp. Illustrated with line drawings and photographs. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $8.50 (1951)

Book was written with two classes of reader in mind: the welding engineer, operator, and instructor; and the designer, works engineer, and metallurgist. Not too technical in nature, it presents the basic facts back of the many welding processes and discusses applications of each to non-ferrous metals. Contents include references and a neat index.

Mechanical actions

The Engineers' Illustrated Thesaurus . . Herbert Herkimer. 572 pp. Illustrated with drawings. Published by Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10. $6.00 (1952)

Consisting largely of over 8000 drawings of machine elements, mechanical movements, parts, devices, tools, and assembled machinery, this guide is cleverly indexed. Main classes consist of fasteners, adjusting devices, supports and structures, basic mechanical movements, elevators, cranes, derricks, conveyors, transmission of liquids and gases, combustion, prime movers, transportation, industrial processes, electrical appliances, comfort heating, cooling and air conditioning.

Practical combustion

Combustion Handbook . . 322 pp. Well illustrated. Published by North American Mfg. Co., 4455 E. 71st St., Cleveland 5. $2.00 plus postage. (1952)

Basic reference on industrial heating with gaseous and liquid fuels includes 178 tables, charts, and illustrations. It contains a glossary of terms used in the combustion industry and over 3000 entries in its index. It provides a basic explanation of the theory of combustion; outlines combustion, heat transfer, and fluid flow calculations; contains charts and data to simplify these calculations; and discusses selection and operation of combustion equipment.

chapter officers / directors

W. O. Wetmore
U.S.N. Ord. Test Station
Arcadia, Calif.
Director / Southern California

Edwin S. Lawrence
General Electric Co.
Schenectady, N. Y.
Vice-Chairman / Eastern N. Y.

Roy A. Payne
Sterling Brass Foundry
Elkhart, Ind.
Director / Michiana

George E. Dalbey
Mare Island Naval Shipyard
Vallejo, Calif.
Director / Northern California

W. F. Graden
Simonds Abrasive Co.
Philadelphia, Pa.
Director / Philadelphia

D. H. L. Bealer
American Brake Shoe Co.
Chattanooga, Tenn.
Vice-Chairman / Tennessee

John G. Blake
Alloy Founders, Inc.
Toledo, Ohio
Chairman / Toledo

Robert H. Jacoby
Key Co.
East St. Louis, Ill.
Treasurer / St. Louis District

William R. Manske
American Manganese Steel
Denver, Colo.
Director / Timberline

C. C. Beagle
Webb Corp.
Webb City, Mo.
Chairman / Tri-State

Albert E. Edwards
Chevrolet Grey Iron Fdy.
Saginaw, Mich.
Director / Saginaw Valley

A. J. Moore
Montreal Bronze Ltd.
Montreal, P. Q., Canada
Chairman / Eastern Canada

A.F.S. Publications

	Publication Number	A.F.S. Members	Non-Members
Books			
Alloy Cast Irons Handbook (2nd Edition)	1	$2.75	$4.50
Analysis of Casting Defects	3	2.50	4.25
Copper-Base Alloys Foundry Practices	57	3.75	5.75
Cupola Operations Handbook	7	6.00	10.00
Development of Metal Castings Industry	8	3.00	6.00
Foundry Core Practice (2nd Edition)	38	6.50	10.00
Foundry Sand Handbook (6th Edition)	12	3.50	5.25
Foundry Work	50	1.76	1.76
Recommended Practices for Sand Casting Aluminum & Magnesium Alloys	24	1.00	1.75
Symposia			
Foundry Dust Control	10	1.60	2.00
Malleable Foundry Sand and Core Practice	16	2.00	3.25
Sand Test Data for Production of Steel Castings	47	3.00	4.75
Symposium on Principles of Gating	56	4.00	5.75
Foundry cost booklets			
Classification of Foundry Cost Factors	6	1.00	2.00
Foundry Cost Methods	9	1.50	3.00
Recommended practices—safety and hygiene			
Fundamentals of Design, Construction and Maintenance of Exhaust Systems	19	3.00	5.00
Good Practices for Metal Cleaning Sanitation	20	1.25	2.25
Grinding, Polishing and Buffing Equipment Sanitation	22	.75	.75
Safety Practice for Protection of Workers in Foundries	21	1.25	2.25
Testing and Measuring Air Flow	26	1.00	2.00
Annual Transactions			
Volume 53—1945	30	4.00	15.00
Volume 54—1946	31	4.00	15.00
Volume 55—1947	32	4.00	15.00
Volume 57—1949	33	8.00	15.00
Volume 59—1951	48	8.00	15.00
Index to AFS Transactions (1930-1940)	36	1.00	2.00
Education			
Apprentice Training Standards for the Foundry Industry	29	1.00	2.00
Foundry Apprentice Course Outline	39	1.00	2.00
Guide for Foremen Training Conferences	34	1.50	2.25
A. F. S. research progress reports			
Aluminum and Magnesium—A Study of the Principles of Gating	54	1.00	1.50
Brass and Bronze—Melt Quality and Fracture Characteristics of 85-5-5-5	55	1.00	1.50
Gray Iron—Risering of Gray Iron Castings—Report No. 1	42	1.00	2.00
Gray Iron—Risering of Gray Iron Castings—Report No. 2	43	1.00	2.00
Malleable—Surface Hardening of Pearlitic Malleable Irons	52	.40	.60
Steel—Steel Sands at Elevated Temperatures (Tenth)	53	.40	.60
A. F. S. special publications			
Bibliography of Centrifugal Casting	35	1.50	2.25
Cupola Research Committee Reports	49	1.00	1.50
Engineering Properties of Cast Iron	46	2.25	3.50
85-5-5-5 Test Bar Design (Fourth Annual Lecture—1946)	37	1.00	2.00
Gating Terminology Chart (Discount on Quantity Lots)		.10	.25
Graphite Classification Chart (25 x 38 in.)	44	1.25	1.75
Pattern Standard Color Chart (Discount on Quantity Lots)	35	.10	.25
Permanent Mold Castings Bibliography	18	1.50	3.00
Other publications			
Aluminum Foundry Process Control (SAE)	2	1.00	2.50
Ferrous Foundry Process Control (SAE)	11	1.50	2.50
Gates and Risers for Castings (Penton Pub. Co.)	40	6.00	6.00
Non-Ferrous Melting Practice (AIME)	41	3.00	3.50

Please send books circled

AMERICAN FOUNDRYMEN'S SOCIETY
616 South Michigan Avenue, Chicago 5, Illinois

Please send the books circled below. $_____remittance enclosed.

1	2	3	6	7	8	9	10	11	12	14	16	18	19	20	21	22
24	26	27	29	30	31	32	33	34	35	36	37	38	39	40	41	42
43	44	45	46	47	48	49	50	51	52	53	54	55	56	57		

Name _____

Address _____

City _____ Zone _____ State _____

Company _____

AFS pays postage when remittance accompanies order.

▶ *Rammed up and poured*

Bill Walkins, foundry bard of the Electric Steel Foundry Co., Portland, Ore., contemplates the significance of a "life sentence."

Life sentence

The whine of the crane as it clanks
down the track,
The roar of the cupola blasting
its stack
The furnace electrodes'
unearthly shrieking,
The hiss of an air hose connection
that's leaking.
The rumble of rollers, mulling
the sand,
The core stock and facing that lumps
in your hand,
A coremaker working and humming
a song
(He'll cuss just as loudly when
something goes wrong).
Such is the scene in a foundry.

Every man has his visions
of settling down
In a vine-covered shack at the edge
of the town
Raising chickens and rabbits
and children as well
Raising corn and potatoes and
maybe some hell . . .

It's all right to dream, but,
listen here, Bud,
There's something about it that gets
in your blood.
In spite of the pleadings
of children and wife,
If you stay here a year you'll remain
all your life.
Such is the way of a foundry.

The four-thirty whistle—then
out through the gates . . .
A couple of beers . . . and wifey awaits
In the door of the cottage.
"You've been drinking again, You'll
never get out of the foundry."

In the doghouse all day,
in the doghouse all night.
No rest for the weary . . . but
wifey is right.
I'll never get out of the foundry.

From the book *Rammed Up and Poured*, by Bill Walkins, copyrighted by the Electric Steel Foundry Co.

STEEL FOUNDRIES

Here's the Answer

—If Core-Production is Slowing Down your Foundry Schedule . . .

Superset

DRY CORE BINDER

Reduce Oven Time 30 to 40%

This remarkable new development in a truly DRY Core Binder is speeding up production schedules in many foundries by cutting baking time as much as one-third . . . And it gives cores that lose less strength in storage, but have greater collapsibility.

Non-Toxic, Non-Irritating. . .

SUPERSET gives off no obnoxious fumes or odor at the shake-out . . . It is non-toxic and non-irritating . . . It reduces scrap due to underbaked cores . . . It gives more satisfactory cores AT LESS COST.

• *Write us . . . We will make arrangements for our technical representative to demonstrate SUPERSET in your foundry.*

Stoller Chemical Co.

225 W. Exchange Street . . . . . AKRON 8, OHIO

pour
clean
aluminum

APEX 1200
ALUMINUM
FLUX

Apex Flux cleanses molten aluminum alloys of oxides and non-metallic material present when remelting foundry scrap and helps dispel gases—a factor in producing sound homogeneous castings having the ultimate in mechanical and physical properties; improved machinability and polishing characteristics. No smoke or fumes, odorless, does not absorb moisture.

Immediate delivery.
Informative folder, with prices, available on request.

APEX SMELTING COMPANY
2533 WEST TAYLOR STREET • CHICAGO 12, ILL.
6702 GRANT AVENUE • CLEVELAND, OHIO

▶ Patton 48 features one-piece castings

■ Hull and turret combinations in one-piece castings were revealed for the first time early in July when the Army unveiled its newest and most advanced medium tank, the long-secret Patton 48.

Elliptical and sloping surfaces of these new hull-turret castings give increased protection against enemy fire-power despite an actual decrease in overall weight.

Contour design of the castings give the new tank, which is in the 45-50 ton class, a much lower silhouette. They also give greater opportunity for more effective crew action. The fighting compartment provides more room for the crew than any other medium tank yet developed. Greater flotation of the tank also has been achieved through development of wider, stronger tracks which disperse its weight over a greater area.

At presentation ceremonies, Patton 48's demonstrated their versatility by clearing such obstacles as a 4-ft water hazard, a 3-ft vertical wall, an 8-ft trench, and "washboard," zigzag courses up sharp grades.

The tank is powered by a V-12, air-cooled engine which develops 810 hp. It is equipped with cross-drive transmission and power steering which practically eliminates driver fatigue. It mounts a new, high-velocity, 90-mm gun which has been designed for quick replacement of gun tubes in the field. Firepower also includes caliber 0.50 and 0.30 anti-personnel machine guns. Battle operations require a crew of four—tank commander, driver, gunner, and loader.

Though pilot models of the tank were not completed until late in December, sizeable deliveries are expected before the end of this year.

One-piece castings of hull and turret for the Army's newest tank, the Patton 48, give its crew greater protection and a wider visual range. Sloping and elliptical contours keep enemy shells from getting a "bite".

EMPIRE
"THAT GOOD"
FOUNDRY COKE
DEBARDELEBEN COAL CORPORATION
2201 First Ave., North Birmingham 3, Ala.
Phone 3-9135

chapter news

continued from page 76

gressive Pattern Co., St. Louis. For terms expiring in 1954: J. H. Williamson, M. A. Bell Co., St. Louis; A. E. Shelton, Shelton Pattern & Eng. Co., St. Louis; J. H. Culling, Carondelet Foundry Co., St. Louis; and F. T. O'Hare, Central Brass & Aluminum Foundry Co., St. Louis. Directors whose terms expire in 1955 are: R. M. Hill, East St. Louis Castings Co.; J. A. Cannon, Duncan Foundry & Machine Works, Alton, Ill.; Wilbert Pickles, American Brake Shoe Co., St. Louis; and G. L. Mitsch, American Car & Foundry Co., St. Louis.

▶ *Production authority names new foundry advisory committee*

■ A new brass and bronze foundry industry advisory committee was appointed by NPA July 25. The first meeting was held on August 14. Members of the committee are: Lester F. Johns, Johnson Bronze Co., New Castle, Pa.; Robert A. Black, Ohio Brass Co., Mansfield, Ohio; L. M. Nesselbush, Falcon Bronze Co., Youngstown, Ohio; Ray Skinner, Down River Casting Co., Rockwood, Mich.; M. L. Gibbard, Fairbanks, Morse & Co., Chicago, Ill.; B. A. Miller, Baldwin-Lima-Hamilton Corp., Philadelphia; Jake Dee, Dee Brass Foundry, Houston, Texas; Thomas W. Pettus, National Bearing Div., American Brake Shoe Co., St. Louis; J. D. Zaiser, Ampco Metal, Inc., Milwaukee; Edwin Griest, Buckeye Iron & Brass Works, Dayton, Ohio; L. H. Durdin, Dixie Bronze Co. Inc., Birmingham, Ala.; E. W. Horlebein, Gibson & Kirk Co., Baltimore; Joseph J. Mayer, Lumen Bearing Co., Buffalo, N. Y.; and Frank G. Volpe, Somerville Mach. & Fdry. Co., Somerville, Mass.

▶ *Steel casting literature available through SFSA*

■ *The Steel Castings Industry—Build with Steel Castings* issued by the Steel Founders' Society of America is a highly-illustrated, 34-page booklet designed to illustrate applications of steel castings. A chart included as a special insert, entitled "General Engineering Types of Steel Castings," gives properties of six structural grades and nine engineering grades of cast steel. The booklet, which includes data on the steel castings industry, is available from SFSA without cost on request.

Other current Steel Founders publications available free are: *Fundamentals of Steel Casting Design*, 32 pages, and *Developments Concerning the Properties of Cast Steels*, 18 pages. *Recommended Practice for the Welding of Steel Castings*, 40 pages, can be obtained for 35¢. The 510-page *Steel Castings Handbook* is priced at $4.00.

Address of the Steel Founders' Society of America is 920 Midland Bldg., Cleveland 15, Ohio.

HAUSFELD
FURNACES

FOR "ALL-OUT" PRODUCTION
IN NON-FERROUS FOUNDRIES

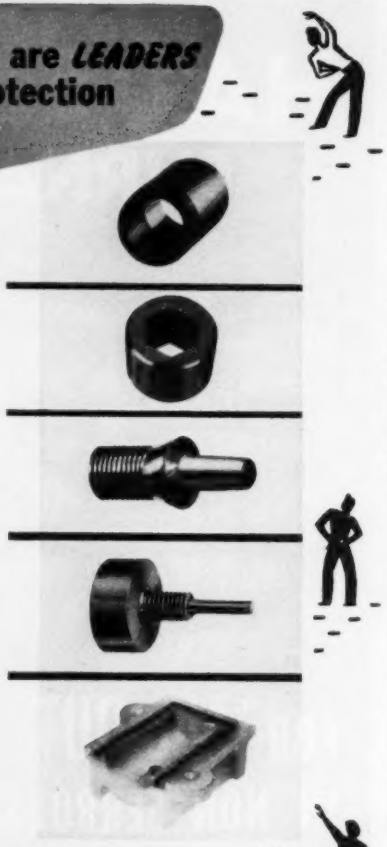
Provide the
Utmost in Speed
Production
and Safety

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.

900-920 MOORE ST. HARRISON, OHIO

These Products are *LEADERS* in Core Box Protection by MARTIN



"SAND ARRESTER TUBE"
Save cores and step up production. Guaranteed for 100,000 blows.

"HOLINER" BUSHINGS
Stop abrasion between blow plate and core box. Protect blow holes.

"PROTEXABOX PINS"
Cannot mar the box face because they will not loosen. Protective rubber tip guaranteed to stay on.

"PULLINSERT" BLOW BUTTONS
Positively stop sand blasting under blow holes. Available in nine popular sizes.

"STRIPINSERT"
Protects parting line—easily installed in old or new boxes. Cutters for groove available at moderate cost.

Rugged all-directional vibration that does not harm the faces of your sand hoppers or bins. Instantly self-starting, needs no lubrication or maintenance. Specify — the Peterson VIBROLATOR.

and NOW... **A NON-BINDING FLASK PIN**

No more production stoppages due to bending or binding of flask pins. No matter how much abuse these pins receive, they flex and absorb it without binding or breaking. They don't require excessive tolerances or skilled labor.

WRITE for descriptive literature or ask your distributor.

MARTIN ENGINEERING COMPANY
KEWANEE 3, ILLINOIS

▶ *ASTM holds 50th anniversary meeting, sets 70 specifications*

■ The American Society for Testing Materials celebrated its 50th anniversary in June with a week-long meeting in New York. As a result of recommendations in some 70 committee reports, 75 new specifications and tests were approved for publication.

R. C. McMaster, Battelle Memorial Institute, Columbus, Ohio, presented the Marburg Lecture. His subject was *"Non-Destructive Testing."* Presented for the first time was the H. W. Gillett Lecture, with Norman L. Mochel, Westinghouse Electric Corp., Philadelphia, speaking on *"Man, Metals, and Power."*

Awards of Merit, presented on recommendation of the various ASTM technical committees, were presented to: Wheeler P. Davey, Pennsylvania State College, State College, Pa.; George H. Harnden, General Electric Co., Schenectady, N. Y.; Jay C. Harris, Monsanto Chemical Co., Dayton, Ohio; Jerome J. Kanter, Crane Co., Chicago; H. S. Mattimore, consultant, Colonial Park, Pa.; Douglas E. Parsons, National Bureau of Standards, Washington, D. C.; Hugh M. Robinson, Underwriters' Laboratories, Inc., Chicago; John D. Sullivan, Battelle Memorial Institute, Columbus, Ohio; Ray Thomas, Union Carbide & Carbon Corp., South Charleston, W. Va.; and Fred D. Tuemmler, Shell Development Co., Emeryville, Calif.

Three awards were made to authors of outstanding technical papers presented at previous meetings of ASTM. Awards and recipients were: Charles B. Dudley Medal—Norman W. McLeod, Department of Transport, Ottawa, Ont., Canada; Richard L. Templin Award—Thomas J. Dolan, University of Illinois, Champaign, Ill.; and Sanford E. Thompson Award—H. F. Gonnerman and William Lerch, Portland Cement Association, Chicago.

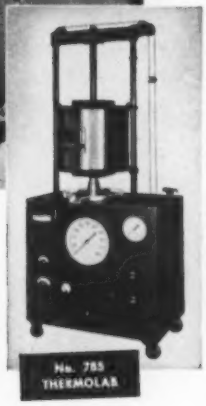
Harold L. Maxwell, E. I. du Pont de Nemours & Co., Wilmington, Del., was elected President for 1952-53, succeeding T. S. Fuller, General Electric Co., Schenectady, N. Y. Norman L. Mochel is the new vice-president. New members of the board of directors are: George R. Gohn, Bell Telephone Laboratories, New York; William H. Lutz, Pratt & Lambert, Inc., Buffalo, N. Y.; Howard K. Nason, Monsanto Chemical Co., St. Louis; Adolph O. Schaefer, Midvale Co., Philadelphia; and Myron A. Swayze, Lone Star Cement Corp., New York.

▶ *National Foundry Association meeting September 18 and 19*

■ 54th annual meeting of the National Foundry Association will be held at the Edgewater Beach Hotel, Chicago, Thursday and Friday, September 18 and 19. Meetings on the following topics are scheduled: labor-management (panel) safety, business prospects, and government and legislation.

GOOD CASTINGS FROM THERMOLAB TESTED SAND

Beloit Iron Works, Beloit, Wis., make these 12 ton Dryer Shells without loss. The Sand is tested daily in the Thermolab.



No. 785 THERMOLAB

Here is a good way to be sure your important castings will come out of the sand in perfect condition.

The above 5 foot Dryer Shell appears just as it came from the shakeout, clean and free from defects.

Beloit Iron Works consider the Thermolab an essential part of their quality control program. Savings in casting finishing operations alone, paid for the Thermolab in the first six months.

High temperature sand testing and control in the Dietert Thermolabs is the key to high casting quality.

HARRY W. Dietert COMPANY

CONTROL EQUIPMENT SAND · MOLD · MOISTURE CARBON · SULFUR

9330 ROSELAWN AVE. • DETROIT 4, MICHIGAN

The Dietert Co. will be glad to explain how a Thermolab can help you.

Write TODAY TO DEPT. A FOR DETAILS

METALS? contact BELMONT for fast delivery

. . . because Belmont is flexible . . . set up to meet tomorrow's schedule *today* if need be . . . organized to rush emergency shipments, large or small. Scheduled deliveries are preferred, of course, but metal uncertainties today have thrown many a well-planned program off. Belmont's quick action helps bring them into line again — gets you immediate, efficient attention to orders or inquires.

Write to receive your copies of Belmont's timely "Metal-of-the-Month" letters.

Metals? ⇨ *Contact Belmont* — up-to-the-minute for over half a century — All Metals, All Alloys, All Forms — and FAST DELIVERY!

"Putting Mettle into Metals Since 1896"

Belmont SMELTING & REFINING WORKS, INC.

301 BELMONT AVENUE BROOKLYN 7, N. Y.

Dickens 2-4900

products

continued from page 17

internally and a "safety web" molded into its surface give the blade a longer cutting life and the ability to withstand greater twisting strains. Blade sizes range from 12 to 18 in. *Eveready Briksaw Co.*

908 End-dump hopper

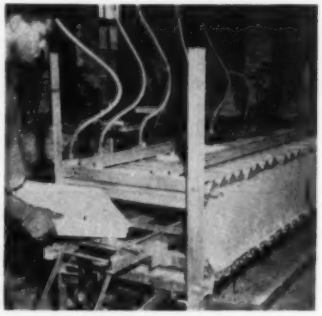
An 80-cubic-ft, end-dump hopper is now available which is designed to handle bulky loose material—sand, gravel, aggregate, and metal scrap. This high-lift, platform truck has a capacity of 4,000 lbs. Hopper can be loaded from overhead or tilted downward to scoop up loads. The platform elevating mechanism is used to dump the hopper. *Yale & Towne Manufacturing Co.*

909 Rotary furnace

Melting of swarf and metal powders with a minimum of oxidation loss is function of Rotary Crucible Furnace now available. In action, the crucible is tilted and rotates continuously. Shape of the crucible, plus its rotary movement, insures rapid and uniform heating. Charge is constantly turned over and brought into contact with the hot crucible wall. Furnace cover remains stationary with the gas or oil burner firing downward through it. Unit is self-contained, requiring only fuel- and air-supply fittings. It is especially useful in the recovery of zinc from residues such as galvanizers' ash, as well as in the reclaiming of brass and bronze swarf, metal powders and skimmings. *The Morgan Crucible Co., Ltd.*

910 Electric mold drying

Chromalox ovens utilize far-infrared electric heat for precision drying of plaster molds used in aluminum casting. Method reduces the 0.002 in. variation of molds dried in gas-fired ovens to the close tolerance of .001 in., cuts number of rejected molds from 25 to 10 per cent. A conveyor moves the molds through the 12-foot oven at about 1½ inches per minute where



they are heated by a barrage of 36 radiant heaters with a total capacity of 39.6 kw. The far-infrared wave length is absorbed, even by white materials, with negligible reflection. Production rate is about the same as that of gas-fired ovens. *Edwin L. Wiegand Co.*

911 Automatic molding

Pushbutton controls on the Model 2160-C jolt, squeeze, strip-draw machine actuate fully-automatic as well as selective manual operations. Jolting action is timer-controlled; squeeze is regulated by a pressure switch. Model 2160-C has a squeeze capacity of 16,000 lbs and a jolt capacity of 1,500 lbs on standard p.s.i. line pressure. *SPO Inc.*

912 Air vibrator

Type VG Air Vibrator can be installed for bench operation with simple face plate and bolts. Steel U-shaped head functions as a vice to clamp the form or device to be vibrated. Incorporated in the head, a serrated steel plate insures positive bite and rigid mounting. Area of the vice jaw is 7½ sq in. The VG is operated with a knee valve covered with sponge rubber as a safety measure. *Cleveland Vibrator Co.*

913 Overhead conveyor

Chainveyer is a light-capacity, overhead chain conveyor that combines flexibility with low-cost maintenance. Short-radii curves (as short as 15 inches) make any combination of turns possible. Changes in track sections can be made in a fraction of the time customarily required.

increase production 40% plus

with the world's most modern snagging grinder

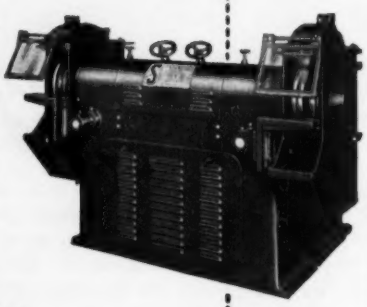
STANDARD'S
***INFINITELY* VARIABLE SPEED**
TWIN-MOTOR SNAGGING GRINDER
Increases Wheel Life!
Lowers Wheel Cost!

The Standard No. 35 is a 2-in-1 machine — each operator is entirely independent of the other; one side may be stationary while the other wheel is operating; one side may be operated with a wheel differing in diameter to the other side, but each wheel operated at its correct and efficient peripheral speed.

Production increases verified in America's largest metal working plants!

24" or 30" Resinoid Bond Wheels. Twin motors of H. P. selected up to 60 H. P. PROMPT DELIVERY!

WRITE FOR CATALOG 44 TODAY!



the STANDARD electrical tool co. **TYPE 35**

2546 RIVER RD. • CINCINNATI 4 • OHIO

See us at the National Metal Exposition, Philadelphia, Pa., Oct. 20-24. Space #908.

Chainveyer handles loads up to 30 pounds on each pendant spaced at six-inch intervals, or 60-pound loads at 12-inch intervals when supported by two pendants fitted with a cross-bar attachment. Power

drive affords straight-line pull in either direction at standard speeds of from three to nine ft per minute. Optional higher or lower speeds available. *United States Spring & Bumper Co.*

914 Smoke recorder

Called the SIR-6L, a new smoke recorder is a null balance potentiometer with rapid traverse and adjustable sensitivity. It has been developed primarily for use with electronic smoke, turbidity, and color photounits. Recorder is provided with red and green signals marking the desired bounds of good combustion, the red signal being set ahead of the smoke point. Settings are by means of thyratron tubes controlling lights. Power relays to operate bells or controls may be added if desired. Charts graduated 0-100 with Ringelmann numbers are available. If it is desired to read good combustion hazes more accurately, optimum haze may be set at 50 on chart and desired limits on either side set off. Charts are 12 in., 24-hour type. *Ess Instrument Co.*

915 Belt aligner

Positive-action belt trainer is designed to keep wandering conveyor belts aligned. This device eliminates wear, down-time, and excessive maintenance costs caused by creeping belts. Trainer can be installed on any conveyor which has the return belt exposed beneath the bed. It is for use with fabric or rubber-covered belts 3/16 in. or more thick, operating at speeds to 200 fpm. Trainer does not interfere with normal conveyor operation, and does not mark or wear the belt in any way. *Rapids-Standard Co.*

916 Pocket microscope

A 50-power, pocket microscope called the Optometer utilizes an engraved scale to make linear measurements as small as 0.0005 in. The Optometer simplifies foundry examination of castings for cracks, blow holes and other surface imperfections. Plated parts can be examined for irregular deposits, pitting, cracks and blister. Precision lenses, fully corrected for color and spherical aberration, give a sharp image up to the very edge of field of vision. The instrument is about the size of a fountain pen. *National Instrument Co.*

HOW DO YOU SEAT YOUR CRUCIBLES?

FIRE BRICK?

Insulates crucible bottom, breaks up the continuous flow of combustion gases, causes uneven heating, shortens crucible life.

OLD CRUCIBLE BOTTOMS?

Provide uneven seating. The dead air space insulates the bottom of crucible, causes faulty heat distribution, shortens crucible life.

DON'T SAVE PENNIES ON MAKESHIFT BASES AND LOSE DOLLARS ON CRUCIBLES AND FURNACE INEFFICIENCY

STARRBIDE BASE BLOCKS

Designed to fit the crucible. Made of the same material as the crucible, Starrbide Bases get heat to the crucible bottom and direct the flow of gases around the crucible for even heating without strains.

AMERICAN REFRACTORIES & CRUCIBLE CORP. NORTH HAVEN CONNECTICUT

ALSO MAKERS OF FAMOUS STARRBIDE CARBON-BONDED CRUCIBLES, GRAPHITE CRUCIBLES AND SUPER REFRACTORIES.

"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

"FALLS"
COPPER
SHOT

for Addition to Cast Iron
Promotes the following properties:

Increased tensile strength,
transverse strength
and Brinell hardness.

Increased wear resistance
—Increased resistance
to heat and corrosion.

Increased fluidity
and sharper castings.

Write for complete details.

NIAGARA FALLS
Smelting & Refining Division
Continental Copper & Steel Industries, Inc.
BUFFALO 17, NEW YORK

news of technical committees

Change division name

■ Light Metals Division is the new name of the Aluminum & Magnesium Division. Suggested by the division and approved by the Board of Directors, the name change came after the Board authorized expansion of the division's activities to include titanium and other lightweight metals. Hiram Brown, Solar Aircraft Co., Des Moines, Iowa, continues as chairman of the Light Metals Division. Immediately developing its broadened field, the division has scheduled one and may hold two sessions on melting and casting titanium at the 1953 Convention to be held in Chicago May 4-8.

College foundry textbook

■ Preparation of the manuscript for the college foundry text is continuing under the authorship of Professors P. C. Rosenthal and R. W. Heine of the University of Wisconsin. They took over when Prof. P. E. Kyle of Cornell University found it necessary to drop his original plans to write the book. Manuscript is expected to be completed early in 1953.

Bronze fracture test

■ Final result of the fracture test studies conducted at the University of Michigan under the Brass & Bronze Research Committee program will be instructional material on use of the test and illustrations and descriptive matter to assist in interpretation of fracture appearance. Meeting in Chicago, the committee selected black-and-white photos of high, medium, and low quality fractures. Supplementing these will be explanatory notes and illustrated booklet on application and interpretation. Also to be prepared is a black-and-white, sound motion picture showing the equipment, test molds, running of the test, and a commentary on its interpretation.

Possible future project to be sponsored by the Brass & Bronze Research Committee is an investigation of corrective treatment for metal shown to be inferior by the fracture test. Participating in the committee meeting were: C. A. Robeck, Gibson & Kirk Co., Baltimore, chairman; H. H. Fairfield, Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.; G. J. LeBrasse, Federal Mogul Corp., Ann Arbor, Mich.; S. C. Massari,

A.F.S. technical director; and Prof. C. Upthegrove, University of Michigan.

New sand committee officers

■ Rotating the work of managing committee affairs, the committee on Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures recently elected H. H. Fairfield, Wm. Kennedy & Sons, Ltd., Owen Sound, Ont., *chairman*, and Elmer C. Zirzow, Werner G. Smith, Inc., Cleveland, *vice-chairman*. They assume posts previously held, respectively, by Victor M. Rowell, Archer-Daniels-Midland Co., Cleveland, and Robert L. Doelman, Miller & Co., Chicago.

Review steel sand research

■ Progress in the six week period following preparation of the 11th annual report on high temperature steel sand research (to appear in the 1952 edition of A.F.S. TRANSACTIONS) was reported at the August 4 meeting of the committee on Physical Properties of Steel Foundry Sands at Elevated Temperatures. The committee decided to make stress-strain and expansion measurements of short time exposures (two minutes at 2500 F only) in addition to the 20 minute exposures at various temperatures investigated up to now. Appearance of test specimens shock heated at 2500 F will be recorded.

In addition, measurements will continue using sand, bentonite, and water mixtures with varying moisture contents, with cereal binder, with silica flour, and with wood flour. Foundry behavior of the mixtures will be determined by pouring test castings in the Cornell University foundry where the research project is being conducted.

Attending the meeting were: Henry W. Meyer, General Steel Castings Corp., Granite City, Ill., *chairman;* R. H. Jacoby, Key Co., East St. Louis, Ill.; H. M. Kraner, Bethlehem Steel Co., Bethlehem, Pa.; S. C. Massari, A.F.S. technical director; John A. Rassenfoss, American Steel Foundries, East Chicago, Ind.; and R. G. Thorpe, Cornell University.

▶ *Color film on sand available to plant and organization groups*

■ *"Traveling with a Grain of Sand,"* color film illustrating the mining of silica sand and its relation to foundry practice, is available at no cost for chapter or plant meetings. This 16 mm film runs about 20 minutes, shows sand deposits and geological formations and how they influence sand behavior and use in the foundry. Supplemented by slides and a technical talk to bring out more clearly the major points of the film, the entire program runs about 35 minutes exclusive of discussion period. Company provides narrator for all showings.

To schedule film and speaker, write American Silica Sand Co., Ottawa, Ill.

Serving this Area

FOUNDRY SANDS • BONDING CLAYS • STEEL ABRASIVES

FOUNDED IN 1917

CARPENTER Brothers Inc.

MUSKEGON, MICH. Phone 4-7248
ST. PAUL, MINN. Phone EM 6312

606 W. WISCONSIN AVE., MILWAUKEE 3, WIS.
PHONE: DAly 8-0140

SEMET-SOLVAY FOUNDRY COKE

Are you always sure that your castings will have the composition, strength and Brinell required by your customers? Users of Semet-Solvay Foundry Coke have a wide margin of safety to compensate for the unpredictable variables which occur even in the best managed foundries.

SEMET-SOLVAY DIVISION
Allied Chemical & Dye Corporation
CINCINNATI • DETROIT
BUFFALO • CLEVELAND
In Canada: SEMET-SOLVAY COMPANY, LTD., TORONTO

for Better Melting

foundry tradenews

Albion Malleable Iron Co., Albion, Mich., won the National Safety Council's Award of Merit banner for decreased accident rates in 1951. The award is given on the basis of improvement, not on injury rates compared with those of the industry. The Safety Council notified the company that their accident frequency decreased by 44 per cent and accident severity by 52 per cent.

Battelle Memorial Institute, Columbus, Ohio, has developed an improved extensometer with new time saving and protective features. The extensometer automatically releases itself from the test specimen before breaking point is reached without stopping the test. The breakaway feature is particularly useful in high-temperature testing operations. Automatic release protects not only the extensometer but also the supplementary indicating and recording mechanisms used in the test. The instrument is simple in construction and parts are easily replaceable. License for its manufacture is yet to be issued.

FOR EXTRA SERVICE and GREATER ECONOMY
Use BUCKEYE Silica Firestone!
• FOR SOAKING PITS
• FOR BESSEMER CONVERTERS
• FOR BLAST FURNACE LADLES
• FOR MIXERS
• FOR GRAY IRON CUPOLAS
• FOR MALLEABLE AND DROP FORGE FURNACES
Nature has endowed Buckeye Silica Firestone with every feature needed in modern refractory material. Its widespread efficiency, long life and attractive cost are well known to foundry and steel mill executives everywhere.
Under conditions where comparative tests have been made, Buckeye is first everytime! Its natural, uniformly-balanced combination of chemical and mechanical properties makes its superiority unquestioned. Its microscopically open and porous structure provides exceptional resistance to heat and abrasion.
Decide today to take advantage of Buckeye's many time-saving and money-making features. Write us at no obligation.
WRITE TO-DAY FOR THE SERVICES OF A BUCKEYE ENGINEER
The Cleveland Quarries Co.
REFRACTORY DEPT.
1740 E. 12th St., Cleveland, Ohio
SEND FOR FREE LITERATURE
BUCKEYE
"FOR THAT EXTRA SERVICE"
SILICA FIRESTONE

Whiting Corp., Harvey, Ill., in its annual report to stockholders and employees states that net profit for the fiscal year 1952 was the largest in the history of the company. After provision for federal income taxes it amounted to $2.87 per share, compared to .70 per share in 1951 and was the largest since the founding of the company in 1884. It was reported that gains were general throughout all departments. Plant facilities at Harvey were expanded, and on the west coast a move to Norwalk, Calif., placed the company in a more advantageous position for serving the far west and Pacific Coast customers and aided in expanding export business.

Crouse-Hinds Co., Syracuse, N. Y., received the Freedoms Foundation award for 1951. Honor medal awards were presented to President Albert F. Hills of Crouse-Hinds and to Editor Van Dusen for speaking up through the publication's pages for Freedom and in particular for *Family Circle's* July 1951 issue which carried a patriotic theme.

Raybestos-Manhattan, Inc., Passaic, N. J., has opened a Houston warehouse at 3012 Canal St. which offers larger quarters with ample stocking facilities for servicing the expanding Gulf Coast industrial area. The new warehouse, which will supplement and service distributors' stocks, is in charge of M. C. Nugent. Principal products carried will be conveyor belting, transmission belting, V-belts, industrial hose of all types, and asbestos and rubber packings. Raybestos-Manhattan also announces the appointment of Webster-Robinson Machinery & Supply Co., Inc. as distributor in the Tacoma, Washington area.

Sonken-Galamba Corp., Kansas City, Kan., has announced the appointment of Russell L. Brown as sales manager of their Chicago branch office located at 188 W. Randolph St., Chicago 1, Ill. Sonken-Galamba only recently announced the opening of another branch office in the Cotton Exchange Bldg. at Dallas, Texas.

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa., has announced formation of **Kewanee-Ross Corp.,** through the joining of Kewanee Boiler Corp., Kewanee, Ill. and the Ross Heater & Manufacturing Co., Inc. Buffalo, N. Y. This new corporation will

operate as a subsidiary of American-Standard with headquarters in Kewanee. Charles H. Currier was elected chairman of the board, and Wm. Bradford Russell, president.

American Machine & Foundry Co., New York, has declared a dividend of twenty cents per share on the common stock payable September 10, to stockholders of record on August 26, 1952.

Sollberger Engineering Company, Inc., Marshall, Texas, his changed its name to Smith Steel Casting Co. President Gerald Smith said the change was made in order to accurately describe the company's products and its business as they are today and will not alter existing services to customers or operation of the business.

Reichhold Chemicals, Inc., New York, plans to manufacture and market powdered phenolics for a wide variety of industrial applications, including molding compounds, foundry shell molds and cores, grinding wheels, etc. Expanded facilities at Tuscaloosa and installation of new 10,000 gallon stainless steel kettles at three of the company's plants have stepped up their output of phenolic resins. Harry Kline, vice-president of the Phenolic Plastics Div., said the foundry industry, which only recently became aware of the benefits offered by the shell molding process, is one of the largest potential users of the new product.

Speer Carbon Co., St. Marys, Pa., has appointed Fred D. Martin manager of the company's entire St. Marys, Pa. manufacturing facilities.

American Refractories & Crucible Corp., North Haven, Conn., changed its name from American Crucible Co. to point up the firm's increasing emphasis on the manufacture and sale of refractory products. Activity continues in the marketing of carbon-bonded silicon carbide, and clay-bonded graphite, crucibles.

Perlite Institute, New York, announces the removal of its offices at 35 West 53rd St. to new and larger quarters at Room 1210, 10 East 40th St. New York 16.

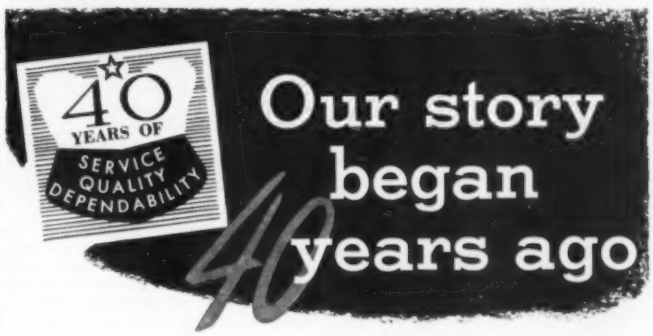
Lufkin Foundry & Machine Co., Lufkin, Texas, is celebrating its golden anniversary. Founded 50 years ago as a repair shop for railroad and sawmill machinery, the company has grown to be the largest manufacturers of oil field equipment in the South.

Tonawanda Electric Steel Casting Corp., North Tonawanda, N. Y., has the welcome mat out at their newly completed foundry. The new building recently won first prize in the industrial division of the New York State Association of Architects competition. One of its outstanding features is an entirely fireproof construction to afford protection of customers' patterns.

Chain Belt Co., Milwaukee, has announced the appointment of Valley Foundry & Machine Works, Fresno, Calif., and Dodge-Yakima Supply Co., Yakima, Wash., as distributors for merchandise products of the chain and transmission divisions, conveyor and process equipment, and Baldwin-Duckworth divisions of the company.

Benjamin Harris & Co., Chicago, celebrated their 50th anniversary by starting full operations in their new million dollar plant. This plant, which was over two years in building, was designed to provide the most modern methods of material handling. One of the buildings houses a new testing laboratory which contains complete equipment for the chemical and physical testing of non-ferrous metals in ingot and scrap form. All of the buildings incorporate the latest working conveniences and modern facilities.

Hagan Corp., Pittsburgh, Pa., has purchased American Cast Products, Inc., Orrville, Ohio. No personnel changes are contemplated. The foundry will continue to serve its customers for gray



It came about because the expanding foundry industry demanded a reliable source of consistently graded core sand. The Nugent Sand Company began to fill this important need forty years ago.

Since then Nugent has kept abreast of the year by year improvements in core sand preparation through improved processing methods and constant product analysis.

The result is constant top quality graded core sands. High standards of service, quality, and dependability have also grown with Nugent.

The fact that our customers have kept us in business for forty years proves that Nugent is doing an outstanding job for the foundry industry.

"Nugent is always ready to serve you"

Call or write your Nugent Representative today

INDIANA PRODUCTS CO. Kokomo, Indiana
WARNER R. THOMPSON CO. Detroit 8, Michigan
KEENER SAND & CLAY CO. Columbus 15, Ohio
CARPENTER BROTHERS, INC. Milwaukee 3, Wisconsin
GREAT LAKES FOUNDRY SAND CO. Detroit 26, Michigan

or write direct to:

1912 CANNON core sand 1952

THE NUGENT SAND COMPANY, INC. MUSKEGON, MICHIGAN

THE Short Cut TO LOW Scrap Losses

When consideration is given to the number of casting defects directly traceable to faulty sand practice, it becomes apparent that proper sand control is the short cut to low scrap losses.

The Gordon-Campbell sand testing units offer the latest improvements for checking these critical properties of sand mixtures: clay content, permeability, bond strength, moisture, core hardness, and core strength. The tests are quick, and no calculations are required. They offer the simplest approach to sand control.

Write for full particulars on Gordon-Campbell sand control units. Savings in scrap losses will pay for the program.

RAMMER-COMPRESSION TESTER—This simple unit combines ramming of specimens for permeability tests and making bond strength tests. Strength values are read on large dial.

PERMTESTER Permeability values for molding and core sand mixtures are shown on dial in a few minutes.

All Gordon-Campbell sand testing units are designed to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

FREE TO ANY FOUNDRY MAN

Write for this booklet. It explains foundry sand control and how to reduce scrap losses.

GORDON SERVICE

CLAUD S. GORDON CO.

Manufacturers & Distributors

Metallurgical Testing Machines • Industrial Furnaces & Ovens • Temperature Control Instruments • Thermocouples & Accessories

Dept. 18 • 3000 South Wallace St., Chicago 16, Ill.
Dept. 18 • 2035 Hamilton Ave., Cleveland 14, Ohio

iron castings under the same manufacturing and sales policies.

Powdered Metal Products Corp., Franklin Park, Ill., unveiled the latest contribution to the field of shell molding machinery August 20 with a demonstration of shell production for lock parts. De-

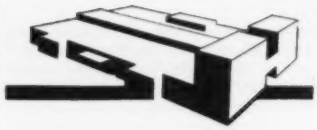
Shell molding machine developed by Powdered Metal Products Corp., Franklin Park, Ill., lifts shell from pattern after oven (background) retracts following completion of baking. Similar machines will be leased to foundries on an initial fee plus rental basis.

signed primarily for small shells, the machine takes pattern equipment which is readily interchangeable so that one to four plates (depending on size) can be mounted to produce the types of shells needed to keep pace with production requirements.

Powdered Metal Products is in production on shell mold castings and, according to George L. Bachner, president of the corporation, will also produce shell mold equipment for lease. Plans are to furnish and install equipment for an initial fee with rental based on the number of shells produced. Powdered Metals will provide complete service, maintaining the equipment, training operators, and if desired will build patterns and furnish the necessary sand-resin mixture.

Construction on a shell molding foundry will start shortly. Scheduled to be in operation by the end of the year, the new shop will have an area of 5,600 sq ft. Castings produced will be primarily high alloy steels and special non-ferrous alloys. Melting equipment will include gas-fired, tilting crucible furnaces and an indirect arc furnace.

Christiansen Corp., Chicago, has taken a new step in financing and in employee relations with its unique issue of 20-year debentures with value based on the consumer price index. Offered primarily to the 500 employees of the corporation's four companies, the debentures pay 4½ per cent interest but



OUR NEW MODERN PLANT AND SPECIALIZED HIGH SPEED PRODUCTION FACILITIES PERMIT

NEW LOWER PRICES and DELIVERY IN ANY QUANTITY

ALSIMAG® Ceramic STRAINER CORES

ALSIMAG STRAINER CORES
Resist heat shock, assure better castings, fewer rejects.

WRITE for new low prices and samples!

AMERICAN LAVA CORPORATION

50 YEARS OF CERAMIC LEADERSHIP

CHATTANOOGA 5, TENNESSEE

OFFICES: Philadelphia • Dallas • Cambridge, Mass. Chicago • Los Angeles • Newark, N.J. • St. Louis

FOSECO FEEDEX

Exothermic Feeding Compound for Better Castings

Here's Proof!

THIS CASTING WAS MADE WITH A FEEDEX SLEEVE

— note small residual feeding head and sound casting

THIS CASTING WAS MADE WITHOUT FEEDEX

— note incomplete feeding from same size riser as used in the Feedex casting

FOSECO FEEDEX is a moldable heat producing compound for automatic feeding. Mix with water, mold into desired shape, bake dry, and insert in mold. A FEEDEX sleeve will keep risers liquid until the casting solidifies. You get a casting free of shrinkage at lower cost — smaller risers, larger yields.

MAKE YOUR OWN TEST!

Write today for a 100 pound trial order and complete information.

FOSECO FEEDEX #3 — for iron and steel
FOSECO FEEDEX #4 — for non-ferrous alloys

If you have a special problem, tell us about it — we'll be glad to be of help.

FOUNDRY SERVICES, Inc.
280 Madison Ave., Dept. K
New York 16, N. Y.

change in value as living costs vary up to a maximum of 150 per cent of the June 15, 1952, index. Value cannot fall below the original purchase price. In announcing the plan, Edward S. Christiansen, president of the corporation, said that no other bonds ever have been issued which gain in value as the owner's cost of living increases. Christiansen Corp. is setting up a $450,000 sinking fund to allow for maximum inflation and ultimate redemption of its debentures.

Basic Refractories, Inc., Cleveland, in their interim report for the first 6 months of 1952 state that net profits were lower than the corresponding 6 months of 1951 due to the influence of inflation upon costs and to the effects of the steel strike.

H. Hirschfield Sons Co., Bay City, Mich., has erected a 7,700 sq ft foundry for their modern metals foundry division. The new shop is equipped with a 25 ft high runway for two cranes, each with a 10-ton capacity, and has a rigid steel frame and steel coverings.

George Fischer Ltd., Schaffausen, Switzerland recently opened to the public an international library in memory of its founder, Johan Conrad Fischer, Swiss ironmaster, who established the European company 150 years ago. The library which contains 8,000 rare volumes on iron and steel was dedicated by Wm. H. Worrilow, Sr., president of Lebanon Steel Foundry, Lebanon, Pa.

Pettibone Mulliken Corp., Chicago, in its annual report to stockholders, traced its success to the company's policy of diversification. The report pointed out that research and development activities were pushed vigorously last year and more money was expended for that purpose than in previous years.

Fred K. Brown Co., Inc., newly formed firm of coal, coke, and pig iron foundry consultants, has opened offices in the Brown-Marx Bldg. at Birmingham, Ala. Fred K. Brown, for many years sales manager of Adams, Rowe, & Norman, heads the new organization.

American Machine & Foundry Co., New York, has taken over the Leland Electric Company's plants at Dayton, Ohio and Guelph, Ontario. The transaction involved the exchange of all Leland's properties and assets for shares of AMF common stock.

U. S. Pipe & Foundry Co., Burlington, N. J. plans to absorb Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., according to the chairmen of the respective companies. U. S. Pipe is a majority stockholder.

Vanadium Corporation of America has started production of ferrosilicon in two of the five electric arc furnaces in the new, $8,000,000 alloy-producing plant at

Chicago MOUNTED Wheels

They're the Best

...now even better with

79E BOND

the new miracle grinding wheel bond

Choose Chicago Mounted Wheels — bonded with 79E Bond — and you'll never buy any other! This tough new grinding wheel bond, exclusive with Chicago Wheel, has taken the industrial world virtually by storm, doing a better grinding, burring and finishing job faster. Greatest selection of sizes and shapes for every application. Best of all, deliveries are good . . . ready when you need them. Try 79E Bond Mounted Wheels.

WRITE today for full information and literature. It's free.

CHICAGO WHEEL & Mfg. Co.
Dept. AF • 1101 West Monroe Street
Chicago 7, Illinois

OFFICES IN PRINCIPAL INDUSTRIAL CENTERS

NON-FLUID OIL

TRADE MARK REGISTERED

Special NR Grades for Pneumatic Tools

Yes, NON-FLUID OIL grades are now made especially for all types of air operated tools and equipment. These new "NR" grades of NON-FLUID OIL give complete protection from rust, even in moist air. The moisture is picked up with the lubricant to form an emulsion. Galling and sticking of pistons or fiber blades are now a thing of the past. Users report 3 to 5 times longer life from cup leathers and wear reduced as much as 80%. "NR" winter grade has extremely low pour point.

Write for Bulletin No. 550 and free testing sample of "NR" grade NON-FLUID OIL.

NEW YORK & NEW JERSEY LUBRICANT CO.

292 Madison Ave., New York 17, N. Y.

Works: Newark, N. J.

WAREHOUSES: Atlanta, Ga. • Birmingham, Ala. • Charlotte, N. C. • Chicago, Ill. • Columbus, Ga. • Detroit, Mich. • Greensboro, N. C. • Greenville, S. C. • Providence, R. I. • St. Louis, Mo.
Also represented in most other industrial Centers including Cleveland Ohio • Cincinnati, Ohio • Philadelphia, Pa. • Pittsburgh, Pa. • Syracuse, N. Y.

NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture.

RIGHT for the JOB at HAND

Because **94** YEARS of specialization in pattern lumber enables the Rietz Lumber Co. to make correct recommendations for the "job at hand."

Providing patternmakers with "know how" and a wide range of species . . . grades . . . widths and thicknesses to meet exact pattern requirements, is an intrinsic part of Rietz service.

Complete Stocks

Genuine Northern White Pine . . . California Sugar Pine . . . Honduras Mahogany. All kiln dried, super thickness, rough or dressed.

Nation-Wide Service

Rietz delivers anywhere . . . in any quantity—100 feet or as much as a carload of excellent flask or pattern lumber.

Write to Dept. AF for details.

RIETZ LUMBER CO. 1810 N. Central Park Ave. Chicago 47, Illinois

Graham, West Va. The furnaces, 22 to 25 ft in diameter, with an over-all rated capacity of 50,000 kilowatts, are among the largest and most efficient in the alloy-producing industry.

Massachusetts Institute of Technology, Cambridge, recently dedicated its new Metals Processing Laboratory, a gift of the Alfred P. Sloan Foundation, Inc. In the address of welcome, Dr. Thomas K. Sherwood, dean of engineering, emphasized that the building would be dedicated to a program of education and research directed toward understanding the basic phenomena underlying use of metals in industry and arts. A foundry laboratory, located on the 4th floor, has been furnished by organizations representing the foundry industry with all the auxiliary equipment required for a first-class foundry. Directly above the foundry laboratory is the Wm. B. Given penthouse lounge, to be used by all groups in the building as a student-teacher social center.

Hyster Company's newly created national accounts office in Chicago is to be headed by Walter A. St. Clair. Mr. St. Clair will devote full time contacting home offices and buying headquarters in the Chicago area.

Frank G. Hough Co., Libertyville, Ill., won the Putman award of the National Industrial Advertisers Association in Chicago. The honor was awarded "for the best use of industrial advertising . . . and the best documentation of such use . . . in making more effective the selling of products or services to industry."

Chain Belt Co., Milwaukee, has announced the appointment of Divine Engineering, Inc., Cedar Rapids, Iowa as distributor for the Chain & Transmission Div., Conveyor and Process Equipment, and Baldwin-Duckworth Divs. of the company.

Allis-Chalmers Manufacturing Co., Milwaukee, has completed arrangements with a group of insurance companies, for a loan aggregating $75,000,000. Borrowings will be staggered to meet company needs, to pay $18,000,000 in serial bank loans, and to complete the company's plant expansion program.

▶ *Cope and Drag Club hears new flowability test details*

■ New methods of sand testing, the function of sand grain colonies during mixing and ramming, and a motion picture on bentonite production were on the program of the regular quarterly meeting of the Cope and Drag Club, held August 14 and 15 at Tamarack Lodge near West Branch, Mich. During one of the business sessions, Harry W. Dietert, Harry W. Dietert Co., Detroit, was elected to honorary membership in the club. Club President Jos. S. Schumacher, Hill & Griffith Co., Cincinnati, presided throughout the meeting.

awards to first prize winners in the 1953 A.F.S. Apprentice Contest. At noon the Gray Iron Round Table Luncheon and the Steel Round Table Luncheon will be held. Afternoon technical sessions cover sand, foundry costs, refractories, and plant and plant equipment followed by gray iron, steel, and time study and methods.

The A.F.S. Alumni Dinner, attended by the Society's "Official Family", is planned for the evening of May 7. Final Gray Iron and Sand Shop Course meetings will be held the same evening, along with a plant and plant equipment session.

Technical sessions Friday, May 8, will offer papers on gray iron, steel, and sand in the forenoon, and gray iron and steel in the afternoon.

The 1953 Convention will conclude at 4:00 p.m. Friday, May 8.

▶ *Picture panels illustrate steel casting applications*

■ Steel Founders' Society of America is preparing to carry the story of steel castings to student groups in all leading engineering schools of the nation during the 1952-53 college terms. Recognizing the increasing emphasis being directed to engineering materials studies, the society has developed 11 new portable display panels designed to convey basic information on steel castings to engineering student and faculty groups. The new panels supplant an original set displayed in more than 120 engineering colleges and universities since initiation of the program. Dramatizing the steel castings theme by use of color, animation and illumination, the 4 x 6 ft panels operate electrically, flashing kodachrome picture combinations of steel casting applications selected to meet engineering and design requirements.

Properties and uses of steel castings are portrayed in Steel Founders' Society display panels to be shown in 120 schools.

EF

Easier HEAT TREATMENT of LARGE, HEAVY CASTINGS

● The gantry crane shown with this battery of EF batch type furnaces picks up castings from a receiving platform — loads them into the furnaces — removes them after heating — lowers them into the quench — removes them after quenching and places them on an unloading platform.

Our wide experience in all phases of heat treating and related material handling problems, puts us in a preferred position to solve most any ferrous or non-ferrous annealing or heat treating problem. We solicit your inquiries.

THE ELECTRIC FURNACE CO.
GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION
Salem - Ohio

CHILL KOOLHEAD NAILS
Chill Nails and Spiders
for...
ACCURATELY CONTROLLED FOUNDRY CHILLING
Write for samples and prices
Choose any style from Jumbo to Stubby; slim, medium or horse nail blade; blunt, pointed, straight or 90° bent. There's a type and size Koolhead Chill Nail or Spider Chill to do your specific chill job best.

You can rely on "KOOLHEAD" and "STANHO" products

STEEL Stanho PRODUCTS
the Quality Line
•WOODRUFF KEYS
•MACHINE KEYS
•MACHINE RACK
•TAPER PINS
•COTTER PINS
•SPECIAL PARTS
and other Stanho products Bulk or Packaged
WRITE for CATALOG and PRICES

STANDARD HORSE NAIL CORP
Since 1872
NEW BRIGHTON PA.

HIGH SILICON IRON

JISCO

T. M. Reg.

SILVERY

A

BLAST FURNACE

PRODUCT

Metallurgically PURE
Physically Clean
and Uniform

The choice of foundrymen
who demand the best

THE JACKSON
IRON & STEEL CO.
JACKSON OHIO

"OLIVER"

30" Disk and Spindle

SANDER

for
pattern
shops

Sands patterns—knots, cross or end grains, screws, nails, etc. Both tables tilt 45°. Disk table adjustable vertically. Takes spindles 2", 3", 4" diameter, 9" long. Has duplicating and circle sanding attachments. Also made as double disk and double spindle sander. Write for folder.

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICH.

PATTERN and FLASK LUMBER
from DOUGHERTY

PATTERN MAKERS' CHOICE!

KILN DRIED IN OUR OWN PLANT!

SOFT TEXTURED! HIGH ALTITUDE!

WHITE PINE • MAHOGANY • PLYWOOD

Here's lumber that will cut pattern and flask costs because it is easier to work and has fewer flaws . . . resists cracking and warping . . . responds properly "under the knife". . . keeps pattern making time DOWN and quality UP.

PALLETS • SKIDS • ROLLERS
BOTTOM BOARDS • TOTE
BOXES • CRATING • FILLETS
DOWELS • TANKS • WEDGES
BENCHES

Dougherty Perfection Pattern and Flask Lumber is the wisest buy for your shop!

MID-AMERICA'S LARGEST LUMBER SUPPLIER . . .

Diamond 1-1200

DOUGHERTY
LUMBER CO.

Cleveland 5, Ohio

coming events

September

16 . . Central Michigan
Kalamazoo Country Club, Kalamazoo, Mich. William Romanoff, H. Kramer & Co. *"Brass and Bronze Foundry Practice."* Golf before technical meeting.

17 . . Oregon
Georgian Room, Heathman Hotel, Portland. S. C. Massari, A.F.S. National Office. *"Effect of Gating Design on Casting Quality"*

17 . . Mo-Kan
Fairfax Airport, Kansas City. A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee. *"Pattern Equipment & Castings."*

18 . . Washington
Stewart Hotel, Seattle. S. C. Massari, A.F.S. National Office. *"Effect of Gating Design on Casting Quality."*

18-19 . . National Foundry Association
Edgewater Beach Hotel, Chicago. Annual Meeting.

19 . . British Columbia
Vancouver Vocational Institute. S. C. Massari. A.F.S. National Office. *"Effect of Gating Design on Casting Quality."*

19 . . Texas
Houston. Dinner and film. *"Effect of Gating Design on Casting Quality."*

22 . . Northwestern, Pa.
Moose Club, Erie, Pa.

22-23 . . Steel Founders' Society
Homestead, Hot Springs, Va. Fall Meet.

25-27 . . Verein Deutscher Giessereifachleute
General Meeting and Foundrymen's Convention. Robert Schumann Hall, Düsseldorf, Germany.

26 . . Ontario
Royal Connaught Hotel, Hamilton. Group meetings: Gray iron and malleable, nonferrous, steel.

26-27 . . Ohio Regional Foundry Conference
Ohio State University, Columbus, Ohio. Sponsored by A.F.S Canton District, Central Ohio, Cincinnati District, Northeastern Ohio and Toledo Chapters and Ohio State Student Chapter.

30-October 3 . . Iron & Steel Exposition
Public Auditorium, Cleveland Association of Iron and Steel Engineers.

October

3 . . Wisconsin
Hotel Schroeder, Milwaukee. William Grede, Grede Foundries, Inc., Milwaukee, President, National Association of Manufacturers.

coming events

3. . Eastern Canada
Montreal. R. A. Colton and D. L. Lavalle, Federated Metals Div., American Smelting & Refining Co., Barber, N. J. *"Making Better Castings."*

6. . Western Michigan
Bill Stern's Steak House, Muskegon. Lester B. Knight, Lester B. Knight & Assoc., Chicago. *"Modernization of Foundries."*

6. . Chicago
Chicago Bar Association. Bernard N. Ames, New York. Naval Shipyard, Brooklyn, N. Y.

6. . Metropolitan
Essex House, Newark, N. J. Richard Herold, Borden Co., New York. *"Resin Core Binders—Ferrous and Non-ferrous."*

9. . St. Louis
York Hotel, St. Louis. S. C. Massari, A.F.S. National Office. *"Effect of Gating Design on Casting Quality."*

15. . Central Michigan
Hart Hotel, Battle Creek, Mich. Frank G. Steinebach, *Foundry*, Cleveland. *"Quality Control In Gray Iron Foundries."*

16-17. . Gray Iron Founders' Society
Hotel Cleveland, Cleveland. Annual Meet.

16-18. . Foundry Equipment Manufacturer's Association
The Greenbrier, White Sulphur Springs, W. Va. Annual Meeting.

17. . Texas
Marshall. Dinner. M. L. Young, U. S. Gypsum Co, Chicago. *"Use of Gypsum Plaster in Pattern Making."*

17-18. . Michigan Regional Foundry Conference
University of Michigan. Ann Arbor. Sponsored by A.F.S. Central Michigan, Western Michigan, Detroit and Saginaw Valley Chapters and A.F.S. Michigan State and U. of Michigan Student Chapters.

24-25. . Northwest Regional Fdy. Conf.
Multnomah Hotel, Portland, Oregon. Sponsored by the Oregon, Washington, and British Columbia Chapters and the Oregon State College Student Chapter of A.F.S.

24-25. . New England Regional Fdy. Conf.
Massachusetts Institute of Technology, Cambridge. Sponsored by New England Foundrymen's Assn. and M.I.T.

30-31. . Metals Casting Conference
Purdue University, West Lafayette, Ind. Sponsored by the Central Indiana and Michiana Chapters and Purdue University.

1953

May

4-8. . A.F.S. 57th Annual Convention
Chicago. Five-day, non-exhibit convention.

ARROW CHIPPING CHISELS

Are made from the finest quality alloy tool steel obtainable. To give you longer service in actual foundry use all Arrow tools have machined shanks.

Arrow tools have a plus quality not found in other tools and hundreds of foundries from Coast to Coast have standardized on them because they give you longer service.

Remember the name ARROW when you buy chisels.

ARROW TOOLS INC.
1904 S. KOSTNER AVE.,
CHICAGO 23, ILL.

ELIMINATE EXPENSIVE DUPLICATE MASTER PATTERNS

AND HIGH CLEANING COSTS

SCIENTIFIC Pressure Cast MATCH PLATES

SAVE WITH SCIENTIFIC

● Write for NEW BULLETIN

"the art of making matchplates"

●

THE SCIENTIFIC CAST PRODUCTS CORP.
1390 East 40th Street
CLEVELAND 3, OHIO
2520 West Lake Street
CHICAGO 12, ILLINOIS

CUT CORE-MAKING COSTS!

Use AMERICAN CERAMIC Strainer Cores!

No need to tie-up expensive coremakers' time with shop-made "skim cores" . . . just use economical, easy-to-handle American Ceramic Strainer Cores.

Speeds production too . . . and remember, American Cores assure you of slag-free castings EVERY time.

American representatives will quote prices on any size Strainer Core.

Write today for samples and descriptive literature.

AMERICAN CLAY FORMING COMPANY
TIFFIN, OHIO ★ TYLER, TEXAS
National Sales Representative
Williston & Company, Delta, Ohio

MANFACTURERS OF SPECIALIZED REFRACTORIES FOR OVER 30 YEARS

Buehler

HAND GRINDERS

for fine grinding of metallurgical specimens

The Buehler Hand Grinder No. 1410 is a most convenient piece of equipment to facilitate the hand grinding of metallurgical specimens. Two grinding surfaces are available for two grades of abrasive paper. When four stages of grinding are desired two No. 1410 grinder units are employed. A drum (7½" diameter) at the head of each grinding surface holds up to 150 feet of abrasive paper that can be quickly drawn into position and clamped firmly for use.

Either wet or dry grinding can be conveniently performed on this grinder. The surface beneath the paper is highly polished heavy black plate glass. Overall dimensions are 15" x 26" x 8"; shipping weight 70 lbs. Polishing surfaces 4" x 12".

No. 1415 grinder accommodates standard size abrasive paper sheets. It serves in a like manner as No. 1410 for the convenient hand grinding of specimens. Overall size 17"x 11"x3". Shipping weight 30 lbs.

THE BUEHLER LINE OF SPECIMEN PREPARATION EQUIPMENT INCLUDES—CUT-OFF MACHINES • SPECIMEN MOUNT PRESSES • POWER GRINDERS • EMERY PAPER GRINDERS • HAND GRINDERS • BELT SURFACERS • POLISHERS • POLISHING CLOTHS • POLISHING ABRASIVES

Buehler Ltd.
A PARTNERSHIP
METALLURGICAL APPARATUS
165 West Wacker Drive, Chicago 1, Illinois

index to

Advertisers

16 Accurate Match Plate Co.
10 Allis-Chalmers Mfg. Co., Tractor Div.
14-15 American Air Filter Co., Inc.
113 American Clay Forming Co.
29 American Colloid Co.
108 American Lava Corp.
103 American Refractories and Crucible Co.
84 Ansul Chemical Co.
98 Apex Smelting Co.
116—Inside back cover Archer-Daniels-Midland Co. (Foundry Products Div.)
113 Arrow Tools Inc.
31 Bakelite Co., A Division of Union Carbide & Carbon Corp.
24 Baker Perkins, Inc.
94 Baroid Sales Div., National Lead Co.
51-52 Beardsley & Piper, Div. Pettibone Mulliken Corp.
101 Belmont Smelting & Refining Works
88 Birmingham Committee of 100
114 Buehler Ltd.
99 Campbell-Hausfeld Co.
6-7 Carborundum Co., The
80 Carl-Mayer Corp.
105 Carpenter Bros., Inc.
109 Chicago Wheel & Mfg. Co.
78 Christiansen Corp.
25 Cleveland Flux Co.
106 Cleveland Quarries Co.
98 DeBardeleben Coal Corp.
5 Delta Oil Products Co.
101 Dietert, Harry W. Co.
23 DoAll Co.
112 Dougherty Lumber Co.
32 Dow Corning Corp.
8 Eastery Clay Products Dept., International Minerals & Chemical Corp.
69 Eastman Kodak Co.
111 Electric Furnace Co.
93 Electro Metallurgical Co., A Division of Union Carbide & Carbon Corp.
82 Fanner Mfg. Co.
1 Federal Foundry Supply Co.
13 Ferguson, H. K., Co.
83 Foundry Rubber, Inc.
109 Foundry Services, Inc.
30 Girdler Corp.
108 Gordon, Claud S., Co.
74 Hough, Frank G., Co., The
91 Induction Heating Corp.
86 Industrial Equipment Co.
9 Industrial Pattern Works
85 International Nickel Co.
112 Jackson Iron & Steel Co.
51-52 Johnston & Jennings Co., The Division Pettibone Mulliken Corp.
4 Link-Belt Co.
100 Martin Engineering Co.
2 Modern Equipment Co.
20 National Carbon Co., A Div. of Union Carbide & Carbon Corp.
73 National Foundry Sand Co.
110 New York & New Jersey Lubricant Co.
104 Niagara Falls Smelting & Refining Div., Continental Copper & Steel Industries, Inc.
107 Nugent Sand Co.
70 Ohio Ferro-Alloys Corp.
112 Oliver Machinery Co.
Inside front cover Pittsburgh Lectromelt Furnace Corp.
81 Polyplastex International, Inc.
110 Rietz Lumber Co.
22 Rotor Tool Co.
19 Royer Foundry & Machine Co.
11 Schneible, Claude B., Co.
113 Scientific Cast Products Corp.
105 Semet-Solvay Div., Allied Chemical & Dye Corp.
102 Standard Electrical Tool Co.
111 Standard Horse Nail Corp.
12 Stevens, Frederic B., Inc.
97 Stoller Chemical Co.
79 Tennessee Products & Chemical Corp.
Union Carbide & Carbon Corp.
31 Bakelite Co.
93 Electro Metallurgical Co.
20 National Carbon Co.
26 U. S. Graphite Co.
89 U. S. Reduction Co.
21 Universal Engineering Co.
Back cover Whiting Corp.

A.F.S. Publications

96 General Book Listing
77 Foundry Sand Handbook

classified

■ To contact advertisers with code number, write to American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill. In replying to "Help Wanted," send outline of background.

▶ Help Wanted

Sales representative

Several territories are open for exclusive sales of AMERICAN Ceramic Strainer Cores and other ceramic products to the foundry industry. Very attractive offers made to those who can give this their full attention.

American Clay Forming Co.
American Foundry Div.
Williston & Co.
Peoples Bank Bldg. Delta, Ohio

Foundry engineers and draftsmen

Having foundry operating or plant experience. Write, enclosing photograph and complete record of education and experience in detail, including previous employers and length of service. State age and salary expected.

Lester B. Knight & Associates, Inc.
Consulting Engineers
600 W. Jackson Blvd. Chicago 8, Ill.

HW 603 . . Foundry engineer

Foundry engineer, large non-ferrous smelter and refiner. State training, experience and references in first letter.

▶ Positions Wanted

PW 177 . . Cleaning room supervisor

25 years' experience in supervision, 10 years' in cleaning and finishing magnesium, gray iron, and steel in both production and job shops. Familiar with chipping, grinding, shot and sand blast, welding, scarfing, burning, etc. Know how to break production bottlenecks. Will move anywhere.

PW 178 . . Foundry metallurgist

Graduate (age 32, married, two children) with management experience desires position as assistant superintendent or supervisor in foundry in Midwest. Broad technical background for field service if necessary. Can handle personnel, sand control, melting problems, methods, radiography, costs, safety gating and risering, military specifications, and would like to develop incentive system. Being released from Navy in October, available for interview now.

PW 179 . . Foundry manager

26 years in machine tool foundries. Experience covers all foundry operations. Specialized knowledge of foundry cost control, incentive systems, industrial relations, production methods and organization. Foundry consultant on sand and quality control, mechanization, cupola operation and general foundry problems. Age 43.

PW 180 . . Sales Manager or Account Executive
Gray Iron—Steel—Non Ferrous

Experienced, personable, producer with excellent active buying contacts, at executive as well as buyer level, in Chicago area and surrounding Mid-central States. Excellent diversification of types of accounts purchasing light, medium, and heavy castings in semi and production quantities. Interested only in organization that has the intent, as well as the plant and equipment to produce quality castings. Salary and incentive.

▶ Accounts Wanted

N 134 . . Manufacturers Sales Representative

with technical background, excellent contacts and friendly customer relationship in automotive, gas and jet engine and other metal working industries desires an additional account. Prefer iron and steel castings. Have large potential with production consumers. Contacting users in state of Indiana. Established office in Indianapolis in 1920.

▶ Wanted

N 132 . . Gray Iron Foundry

Must be in Chicago or immediate Chicago area. 15,000-20,000 sq. ft. floor space. Will consider any building suitable for foundry operation.

N 138 . . Transactions of A.F.S.

Will buy bound or unbound A.F.S. Transactions, *Vol. 56*, 1948.

▶ For Sale

Gray Iron Foundry

Located northeastern Ohio—In Dover. Personnel available for immediate operation. Building and equipment suitable for jobbing work. Address:

Schrader Foundry, Box 149, Dover, Ohio

N 137 . . Hydraulic Casting Washed

Pangborn equipment. Enclosure 25 ft. wide, 25 ft. long, 16 ft. high, with access doors at top and one end. Equipped with 12-ft. diameter motor-driven turntable, and two Ingersoll-Rand multi-stake centrifugal pumps (one spare) with 150 hp motors, and nozzles which afford streams of approximately 500 GPM at 300 lb. pressure or 300 GPM at 500 lb. pressure. Now in operation. Price reasonable. Electrical characteristics 440 volt, 3 phase, 60 cycle.

MOVING?
To avoid delay in receipt of
AMERICAN FOUNDRYMAN
when you move, send prompt notification of your new address.
Write to
American Foundrymen's Society
616 S. Michigan Chicago 5, Ill.

▶ Professional Services

Harold J. Roast
F.I.M., F.C.S., M.E.I.C.
BRONZE FOUNDRY CONSULTANT
c/o Crown Trust Co.
284 Dundas St. London, Ont., Canada
Available Coast to Coast

Lester B. Knight & Associates, Inc.
Member A.C.M.E.
Consulting Engineers
Management • Sales • Production • Surveys
Modernization • Mechanization
600 West Jackson Blvd., Chicago 6, Ill.
Eastern Office: Lester B. Knight and Associates
30 Church St., New York 7, N. Y.

Westover ENGINEERS
FOUNDRY MANAGEMENT CONSULTANTS
3110 West Pond Du Lac Ave., Milwaukee 10, Wis.
There is no better time than NOW to review incentives, methods, scheduling, production control and paperwork processes.

EARL E. WOODLIFF
FOUNDRY SAND ENGINEER
Consulting • • Testing
14611 Fenkell (5-Mile Rd.) Detroit 27, Mich.
Res. Phone Vermont 5-8724

METALLURGICAL
CHEMISTS *Accuracy* **CONSULTANTS** *Service*
ACCURATE METAL LABORATORIES
2454 W. 38th St. • Phone: VI 7-6090 • Chicago 32, Ill.

W. G. REICHERT ENGINEERING CO.
PROFESSIONAL FOUNDRY ENGINEERS
Surveys • Modernization
Operations • Management
1060 Broad St. Newark 2, N. J.
Industrial Bldg.

CHEMISTS and METALLURGISTS
Grey Iron Foundry Consultants
Complete Foundry Testing
Established over 25 years
A. H. PUTNAM COMPANY
Rock Island, Illinois

BOWSER-MORNER TESTING LABORATORIES
Chemical—Metallurgical—Testing Engineers: Field and Laboratory Inspection and Tests—Chemical—Physical—Metallurgical—X-Ray Diamond Coring—Environmental Testing.
135-143 Bruen St. P.O. Box 51,
Dayton 1, Ohio

Badger Malleable and Mfg. Co.

(South Milwaukee, Wisc.)

Cuts Baking Time In Half

WITH

INDUCTOL!

STEADY LINOIL USER DISCOVERS INDUCTOL TO BE BEST ANSWER TO SHORT BAKING CYCLE

Suddenly faced with the problem of producing cores almost twice the size of their usual work, Badger found that the added baking time needed for the larger work disrupted their tight oven scheduling.

Consulting with their LINOIL representative, they heard about INDUCTOL, the "prebaked" core oil. They tried some and found that INDUCTOL cut *in half* the baking time for these larger cores. Furthermore, the cores were so well baked that the slight problem of an occasional cracked casting was completely eliminated.

Badger Malleable is enthusiastic about INDUCTOL's solution of their baking problem. If you have a problem that conventional core oil can't solve, ask your LINOIL man to tell you about INDUCTOL.

WRITE TODAY *for more information on INDUCTOL. A new booklet, "Facts about the LINOIL 700 Series" is also available on request.*

ARCHER • DANIELS • MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110TH STREET • CLEVELAND 2, OHIO

Coremaker at Badger places dryer on one-piece blown core that will be baked only two hours, where it previously required 4 hours. Oil-Sand ratio: 1 quart INDUCTOL to 300 pounds Silica Sand.

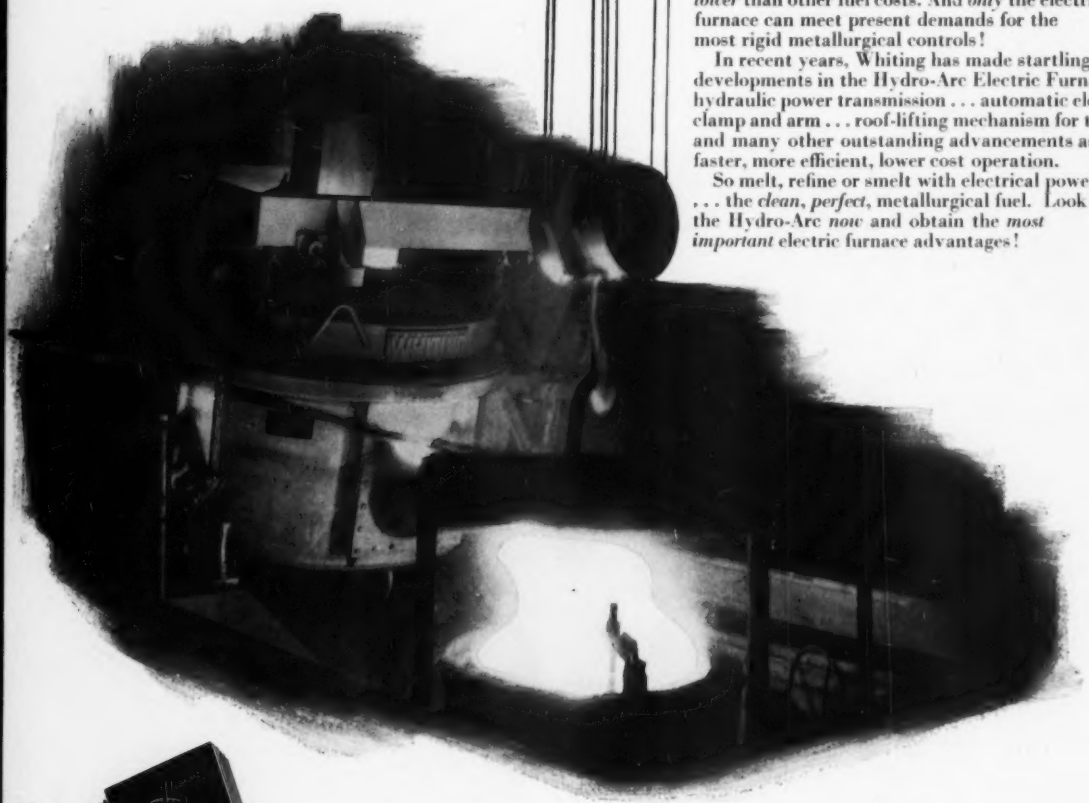
ELECTRIC MELTING...

TODAY'S ANSWER TO GREATER ECONOMY!

The electric furnace is now the answer to *many* melting problems! That's because electrical energy has come to be *more and more economical* . . . in fact, today it is relatively *much lower* than other fuel costs. And *only* the electric furnace can meet present demands for the most rigid metallurgical controls!

In recent years, Whiting has made startling developments in the Hydro-Arc Electric Furnace. Our hydraulic power transmission . . . automatic electrode clamp and arm . . . roof-lifting mechanism for top charge and many other outstanding advancements assure faster, more efficient, lower cost operation.

So melt, refine or smelt with electrical power . . . the *clean, perfect,* metallurgical fuel. Look into the Hydro-Arc *now* and obtain the *most important* electric furnace advantages!



GET COMPLETE INFORMATION NOW!

Send for 40-page booklet giving all Hydro-Arc features . . . tilting arrangements . . . electrode data . . . controls . . . capacities and other information.

WHITING CORPORATION

15628 Lathrop Ave., Harvey, Illinois

Remember . . . Electricity Is Low Cost, Clean, and Reliable!

WHITING

Hydro-Arc

ELECTRIC FURNACES